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DEPARTMENT OF THE INTERIOR
ALBERT B. FALL, SECRETARY

UNITED STATES RECLAMATION SERVICE
ARTHUR P. DAVIS, Director

Clemson University
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TWENTIETH ANNUAL REPORT

OF THE

RECLAMATION SERVICE

1920-1921

WASHINGTON
GOVERNMENT PRINTING OFFICE
1921

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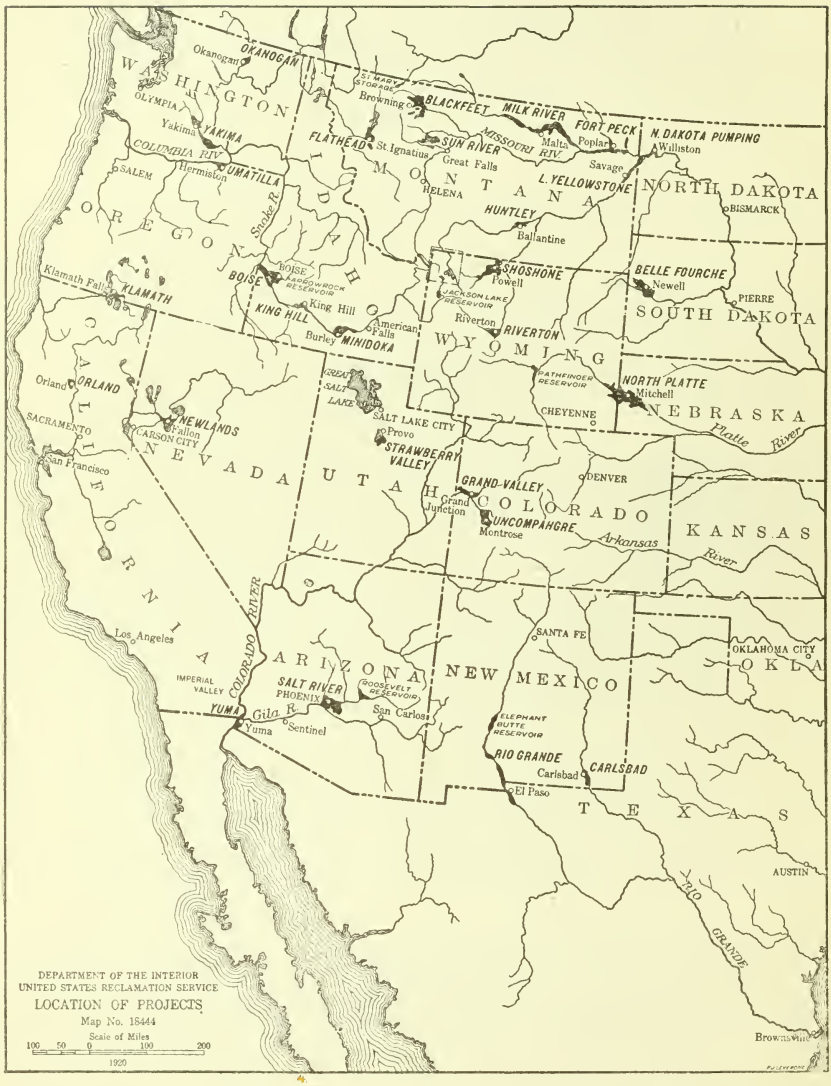
DEPARTMENT OF THE INTERIOR
UNITED STATES RECLAMATION SERVICE
LOCATION OF PROJECTS
Map No. 18444
Scale of Miles
100 50 0 100 200
1920
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLA
TEXAS
OKANOGAN
Okanogan
ST. MARY'S STORAGE
Browning
BLACKFEET
MILK RIVER
FORT PECK
Malta
Poplar
N. DAKOTA PUMPING
Williston
Savage
MISSOURI RIV.
SUN RIVER
Great Falls
FLATHEAD
St. Ignatius
HELENA
L. YELLOWSTONE
HUNTLEY
Ballantine
BISMARCK
OLYMPIA
Yakima
YAKIMA
COLUMBIA RIV.
SALEM
Hermiston
UMATILLA
Snake R.
Klamath Falls
KLAMATH
BOISE
BOISE
ARROWROCK RESERVOIR
KING HILL
King Hill
Burley
MINIDOKA
American Falls
SHOSHONE
Powell
JACKSON LAKE RESERVOIR
Riverton
RIVERTON
BELLE FOURCHE
Newell
PIERRE
Orland
ORLAND
SACRAMENTO
San Francisco
NEWLANDS
Stillwater
CARSON CITY
GREAT SALT LAKE
SALT LAKE CITY
Provo
STRAWBERRY VALLEY
PATHFINDER RESERVOIR
NORTH PLATTE
Mitchell
CHEYENNE
Platte River
DENVER
GRAND VALLEY
Grand Junction
UNCOMPAHGRE
Montrose
Arkansas River
Los Angeles
COLORADO RIVER
IMPERIAL VALLEY
YUMA
Yuma
Gila R.
Sentinel
SALT RIVER
PHOENIX
ROOSEVELT RESERVOIR
San Carlos
SANTA FE
OKLAHOMA CITY
ELEPHANT BUTTE RESERVOIR
RIO GRANDE
Carlsbad
CARLSBAD
El Paso
AUSTIN
RIO GRANDE
Brownsville

LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES RECLAMATION SERVICE,
Washington, D. C., September 13, 1921.

SIR: Transmitted herewith is the Twentieth Annual Report of the Reclamation Service.

This report relates in particular to the work completed and in progress during the fiscal year ended June 30, 1921, but contains also information in regard to previous operations in order that the methods, progress, and results of reclamation work may be more readily understood.

Very respectfully,

MORRIS BIEN, *Acting Director.*

The SECRETARY OF THE INTERIOR.

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TWENTIETH ANNUAL REPORT

OF THE

RECLAMATION SERVICE.

GENERAL DISCUSSION.

THE PROGRESS OF RECLAMATION.

Nineteen years have elapsed since the reclamation act became law June 17, 1902 (32 Stat., 388). This dedicated to the work of reclaiming arid lands in the western United States the bulk of the receipts from the disposal of public lands. These receipts were constituted a special reclamation fund in the Treasury. The Secretary of the Interior was charged with the administration of this fund. By the reclamation extension act of August 13, 1914 (38 Stat., 686), Congress resumed control of the reclamation fund, requiring annual estimates and appropriations, which are made for specific projects in the sundry civil acts. These appropriations are made from the reclamation fund and are effective only to the extent that the money in the fund permits. The sundry civil acts have uniformly carried a specific provision to that effect, viz, that at no time shall the expenditures exceed the moneys available in the reclamation fund.

Immediately after the enactment of the organic act the Reclamation Service was organized by the Secretary of the Interior, first under the direction and control of the Director of the Geological Survey but not a part of the Geological Survey; then on March 9, 1907, by order of the Secretary of the Interior as an independent service under a director of its own.

Investigations and surveys were begun in 1902 immediately after the passage of the act and construction was begun in 1903. Projects were selected in most of the arid and semiarid States. Active construction work reached a maximum in 1907, and then fluctuated to fit the flow of incoming funds to another maximum in 1915.

In 1906 and 1907 the Reclamation Service began the delivery of irrigation water from works constructed under the act, and also from several canal systems built under private auspices, which were absorbed into the larger Government projects in association with improved and more extensive systems of distribution as well as large storage reservoirs built by the Service.

Since the passage of the reclamation act, June 17, 1902, the gross expenditure thereunder has been, roughly, $160,000,000. This includes considerable money that is turned over somewhat rapidly; for example, the annual turnover for operation and maintenance. The net investment in construction work to date is in the neighborhood of $130,000,000.

It is impossible to give precise values for the project lands before and after the Government work, but it is known that the direct increase in land values has been very great. This is illustrated by the frequent sales of the irrigated lands at high prices. Such prices are commonly reported at $200, $300, or $400 per acre, and in the case of highly improved land have, in rare instances, reached as high

as $1,000 or $1,500. On the basis of productivity the desert lands were well-nigh worthless before the Government work, and large areas in the projects were then held at $10 per acre or less. It has been roughly estimated that Government irrigation has increased the value of the project lands $200 per acre on the average, or a total of over $350,000,000; that it has increased the value of 1,000,000 acres in other projects served under the Warren Act by $100, or a total of $100,000,000. The increase in the value of lands in the cities, towns, and villages within the projects is believed to exceed $100,000,000, making a total increase in land values of over $500,000,000 based on Government reclamation work. These estimates of course are extremely rough, and would be less in 1921 than in 1919, owing to changed financial conditions.

The following table shows the progressive increase in irrigable acreage, irrigated acreage, cropped acreage, and crop value since 1913. These figures, it should be particularly noted, relate only to those areas on the reclamation projects proper which are covered by crop statistics, and do not include a large area receiving either a complete or partial water supply under the Warren Act from the irrigation works constructed by the Service. Including these areas, from which no crop statistics are secured by the Service, it is estimated that the value of crops produced in 1920 amounted to nearly $114,000,000.

Year.	Irrigable acreage.	Irrigated acreage.	Cropped acreage.	Crop value.
1913	1,181,362	694,142	637,227	$15,676,411
1914	1,240,875	761,271	703,424	16,475,517
1915	1,330,222	814,906	757,613	18,164,452
1916	1,405,452	922,821	858,291	32,815,972
1917	1,502,468	1,026,663	966,784	56,462,313
1918	1,601,934	1,119,566	1,051,193	66,821,396
1919	1,636,159	1,187,255	1,113,469	88,974,137
1920	1,661,960	1,225,480	1,153,820	66,171,650

CONSTRUCTION ESTIMATES.

A popular conception of the Reclamation Service is that of a public utilities corporation functioning in many lines of usefulness in 15 States. In other words, it is a business corporation whose headquarters are at Washington, D. C., where are located its president, the Secretary of the Interior; its general manager, assistant general manager, and legal adviser, the director, the assistant director, and the chief counsel; and its board of directors, the Congress of the United States. Branch offices of the corporation are located on the 25 projects, with a field superintendent, the chief engineer, located at Denver, Colo. Its stockholders are the water users on the projects.

The business of the corporation is changing desert wastes into habitable lands, bringing together the landless man and the manless land, and virtually creating a new State from the standpoint of agricultural development.

At the present time the organization is serving the most important needs of thousands of people, furnishing a water supply without which these people could not permanently reside in their present homes. In addition the Service is supplying power for lighting many cities and towns. The electric current from Government power plants moves the wheels of innumerable industrial plants and supplies heat and light to thousands of farm and city homes. The activities of

the Service, including the construction of important dams, excavating canals, drains, and tunnels, measuring and accurately delivering water to 33,000 individual farms, operating power and pumping plants, collecting and disbursing millions of dollars annually, cover a wide range and necessitate wise management, careful attention to detail, and practical foresight and experience.

As the expenditures are reimbursable and are made directly under the eyes of those who are obligated to repay the cost of construction, the position of a Reclamation Service engineer is far more trying than that of an engineer whose funds are provided by general appropriation from the Treasury, in which there is little individual concern. Every dollar expended on a project must be repaid by the farmer whose lands are benefited. Naturally the avoidance of mistakes, the lowering of costs, and the development of economic practices are constantly in mind.

Funds for the work of the Service come largely from the receipts from the sale of public land, from repayments by the water users, and more recently from oil-leasing and other mineral operations. The annual receipts from the sale of public land are fairly well known from years of experience and can therefore usually be predicted with some degree of accuracy. Similarly more or less close estimates can be made of the receipts to be expected from year to year from repayments and from miscellaneous sales. This situation, however, does not obtain with respect to the receipts from oil-leasing operations, for the reason that when the act became law there were so many contingencies that it was impossible accurately to forecast the results in their bearing on the reclamation fund. The act dealt with both previous production and future production; in the former case the operators were given six months in which to make certain elections, and hence the date and the amount of such receipts depended largely on the decisions to be made by many people, in some cases upon the outcome of litigation.

In the fall of 1920 the Reclamation Service submitted to Congress its requests for appropriations for the fiscal year 1922, based on the best available estimates of the expected amount that would be available in the reclamation fund from the sources indicated. These estimates included an estimate from the General Land Office that the receipts under the oil-leasing act would amount to $15,000,000 for the fiscal year 1921 and to $10,000,000 for 1922. Under the law the percentage of the receipts which would enter the reclamation fund amounts to 70 per cent for so-called past production and 52½ per cent for future production.

Realizing the advantages which would accrue to the country in general and to the development of the West in particular from the widest possible expansion of construction work on the projects already under way and on extensions of these projects or the undertaking of new projects, the Reclamation Service requested of Congress authorization for the expenditure of some $20,000,000, the full amount which it was expected would be available for the fund from the various sources of revenue; and this amount was authorized by Congress, after hearings at which the Director of the Reclamation Service testified in December.

Subsequent to the presentation of this estimate for $20,000,000 various revisions were of necessity made on the basis of more definite

data chiefly concerning the oil-leasing receipts, and the result has been to scale down the estimated amount which would be received by the Government from this source. In March, 1921, these receipts were estimated at $15,500,000 for the fiscal years 1921 and 1922, as compared with $25,000,000 in the previous estimate. Still later revisions continued to reduce the estimated receipts by the Government and the reclamation fund, with the result that the reclamation fund actually benefited to the extent of only about $2,000,000 from this source, available for construction during the fiscal year 1921.

As indicated, some time prior to the close of the fiscal year 1921 it was realized that the funds available for the fiscal year 1922 would fall far short of the estimate. As in the case of other business concerns the Reclamation Service suffered from the general business depression throughout the country, resulting in curtailment or complete cessation of oil operations and a disastrous slump in the prices of agricultural products, which, combined with excessive freight rates, put the farmer in a position where he was unable to market his crops at any figure approaching the cost of production. This led in turn to many requests for deferred payment of charges from the projects, with a corresponding decrease in the amount of repayments.

This situation of the water users was recognized by Congress in the passage of Public Resolution No. 3, approved May 17, 1921, which provided—

> That in view of the financial stringency and the low price of agricultural products, the Secretary of the Interior is hereby authorized, in his discretion, after due investigation, to furnish irrigation water on the Federal irrigation projects during the irrigation season of 1921 to water-right applicants or entrymen who are in arrears for more than one calendar year for the payment of any charge for operation and maintenance, or any construction charges and penalties, notwithstanding the provisions of section 6 of the act of August 13, 1914 (38 Stat., p. 686): *Provided*, That nothing herein shall be construed to relieve any beneficiary hereunder from payments due or penalties thereon required by said act.

To summarize, instead of having available $20,000,000 for a broad construction program, as expected and as authorized by Congress, the estimated amount will probably be not more than ten or twelve millions. Land sales are expected to approximate $2,500,000 and the balance in the fund at the end of the fiscal year 1921 amounted to about $3,500,000, of which, however, about $2,500,000 should be reserved as a working balance at the end of the fiscal year 1922. The general business depression also affected the oil-leasing operations, so that the receipts available in 1922 from this source are now estimated at only $3,000,000; and the normal repayments by the water users, which should approximate $5,000,000, will probably be reduced to $4,000,000 or less by reason of the financial depression and the action of the water users in taking advantage of the provisions of the joint resolution quoted above. As operation and maintenance costs are continuing and nearly constant, funds otherwise available for construction must, by reason of the deferred repayments, be used to cover operating costs.

It should be borne in mind, however, that the fact that an estimate for the expenditure of some $20,000,000 during the fiscal year 1922 was made and approved by Congress does not presuppose that the organization of the service was expanded to meet the expected increase in work. The skeleton organization was in existence, and with the anticipated receipt of larger funds could readily have been

expanded to meet the expected increased construction program, but in general few increases in the force were made, and then only where necessity demanded, as was the case in the construction of the Tieton Dam on the Yakima project, which had begun before the European war and was stopped on account of it. In other words, there was practically no increase in the overhead expense in anticipation of the receipt of largely increased funds for construction purposes for the fiscal year 1922.

The percentage which the general expense in 1921 bore to the total cost of construction and operation amounted, for the projects as a whole, to 9.27 per cent, which compares favorably with the general expense percentage of other business concerns. This percentage in the Reclamation Service has varied from 15 per cent in 1917 to 6.25 per cent in 1908, with an average of 9.31 per cent for the years from 1907 to 1921, inclusive.

REPAYMENTS BY SETTLERS.

The reclamation law is unique among American laws in requiring that moneys expended in carrying out its provisions be afterwards collected from those for whose benefit it has been spent. In this respect it has from the first been regarded as an experiment and various difficulties are attached to carrying out the intent of the law so that the subject of collections is one that requires constant attention and care.

The difficulties of collection are intensified by the fact that the time necessarily consumed in construction, and generally greatly extended from lack of funds, plus the time necessary in settlement and reduction of lands to production, separate the period and circumstances of expenditure from those of collection, and leave the connection of these two activities somewhat remote. Under these conditions any one desirous of escaping or reducing his payments is tempted to discredit the work and argue that it was unwisely planned or executed without proper economy and efficiency. In addition to the above, it is sometimes actually difficult or impossible for the settler to make payment either on account of adverse physical circumstances or his own lack of capital or mismanagement. At best, therefore, the collection of charges is a problem fraught with difficulties, but at the present time these are aggravated by the peculiar industrial conditions.

During the five years from 1915 to 1920, the constant and rapid inflation of currency, together with other industrial conditions, caused a rapid advance in prices of labor and materials and consequently in the cost of maintenance and operation of the projects. These costs have to be estimated in advance and the deficits of one year added to the charges for the next. It was impossible to fully foresee these conditions and, therefore, during the period mentioned estimates were almost invariably too low and the margin of error was necessarily large. Each year the estimates would be increased but not sufficiently to cover the advances in cost and the result is an accumulation of deficits which must, under the law, be collected in the years following those in which they were incurred. As already pointed out, the reversal of industrial tendencies was felt most keenly by the agricultural communities and the settlers on the Government projects were caught with a crop produced with high-priced labor and machinery during the early months of 1920, which was necessarily thrown on a demoralized market in the autumn of that year. The

result was that many of the staples either found no market at all or had to be sold at prices far below the cost of production.

This was coincident with the necessity of paying accumulated deficits in operation and maintenance in addition to the gradually increasing construction charge falling due the same year. Inevitably many were unable to pay, and recognizing this condition Congress passed the act approved May 17, 1921, suspending the requirement that water be denied settlers delinquent in their payments. This was done without relieving any settler from any of his charges or any of the penalties accruing thereon, but it served to permit a further attempt at farming so that he could continue his efforts.

On June 30, 1919, the uncollected construction charges for the year 1918 (due Dec. 1, 1918) amounted to 15.3 per cent. Similar charges for the year 1919 were 14.4 per cent uncollected on June 30, 1920, and for the year 1920 the uncollected charges on June 30, 1921, amounted to 39.9 per cent.

A comparison of the operation and maintenance charges for the same years shows uncollected 22.3, 21.4, and 46.3 per cent, respectively.

Thus for each class of accounts the percentage of uncollected has materially increased, owing largely to the general financial depression.

Present conditions have improved in some respects and the majority of the settlers will be able to bring their payments up to date, but the difficult conditions have inevitably ruined some and greatly embarrassed many others.

The present year is one of excellent prices for potatoes and fruits, and so far as the settlers have raised good crops of these they have been restored to comparative prosperity, but the great staple crop of the West, alfalfa, upon which dependence has generally been placed, is still usually below the cost of production. This is due largely to the depletion of the ranges of the cattle and sheep, the wintering or fattening of which constituted the chief market for alfalfa, so that no immediate recovery in this respect can be anticipated. The best solution of the difficulty is in the acquirement of dairy cattle, thus turning the alfalfa into milk, butter, and cheese, the market for which remains good. Dairy farming on all of the projects has always been and remains prosperous, and in view of large importations of dairy products, which are constantly increasing, there is no probability of this condition materially changing.

Under the circumstances cited, however, it is extremely difficult for farmers to replenish their dairy herds or to establish new ones, the depletion of cattle having made great inroads upon the supply of good dairy stock and the financial condition of the farmer being as above described.

Under all of these trying conditions, it is not surprising that complaints are made against the alleged oppression of the reclamation laws or the officers executing them. Rather, it is surprising that these have been as few and as reasonable as they are. The conditions described have led to more leniency of action on the part of the Interior Department, such as postponement of collection of charges where this could legally be done by postponing their announcement. Such action, together with the accumulated delinquencies, has greatly depleted the reclamation fund and restricted its progress in construction work. The conditions, however, have begun to improve.

RESULTS OF IRRIGATION.

The accompanying table summarizes data relating to a number of interesting items in connection with the settlement of the projects. Some of these data, particularly for the year 1900, are estimated, but are as nearly accurate as possible. The results, as shown in the table, are attributable mainly to irrigation development by the United States. This is well illustrated in the Salt River Valley in Arizona, and on other projects where the arid nature of the country prohibits cultivation without irrigation, and the limit of irrigation without storage had been reached. A few cities and towns adjacent to the projects, but not actually within their boundaries, are included in the table. It is believed, however, that the growth of these towns during the past two decades can fairly be attributed to the development of irrigation in their immediate vicinity.

Settlement data—United States Reclamation Service projects, 1900 and 1920.

State and project.	Irrigated farms.		Towns.		Number of schools.	Number of churches.	Banks.			
	Number.	Population.	Number.	Population.			Number.	Capital stock.	Deposits.	Depositors.
Arizona:										
Salt River—										
1900	.....	.....	8	7,596	12	21	7	$340,850	$1,498,290	9,000
1920	4,200	31,600	14	39,795	57	62	20	1,752,500	24,426,057	35,000
Increase	.....	.....	6	32,199	45	41	13	1,411,650	22,927,767	26,000
Arizona-California:										
Yuma—										
1900	.....	.....	1	1,300	7	3	2	30,000	50,000	100
1920	1,230	5,100	5	7,085	15	23	6	255,000	2,100,000	9,175
Increase	.....	.....	4	5,785	8	20	4	225,000	2,050,000	9,075
California:										
Orland—										
1900	.....	.....	1	400	5	3	1	50,000	32,000	20
1920	644	1,844	1	1,700	10	7	2	196,000	1,020,000	2,900
Increase	.....	.....	0	1,300	5	4	1	146,000	988,000	2,880
Colorado:										
Grand Valley [1]—										
1900	.....	.....	3	3,658	18	19	3	90,000	440,000	680
1920	371	1,019	6	11,415	23	28	7	465,000	3,743,000	10,150
Increase	.....	.....	3	7,757	5	9	4	375,000	3,303,000	9,470
Uncompahgre—										
1900	.....	.....	3	2,600	5	12	4	130,000	450,000	1,400
1920	1,588	6,015	3	8,100	27	27	8	621,763	4,925,150	11,000
Increase	.....	.....	0	5,500	22	15	4	491,763	4,475,150	9,600
Idaho:										
Boise—										
1900	.....	.....	4	7,788	9	18	6	450,000	3,650,000	7,000
1920	3,260	11,176	10	36,400	28	56	17	1,850,000	20,600,000	32,000
Increase	.....	.....	6	28,612	19	38	11	1,400,000	16,950,000	25,000
King Hill—										
1900	.....	.....	4	500	1	1	0	0	0	0
1920	125	264	4	1,572	6	5	1	30,000	220,000	600
Increase	.....	.....	0	1,072	5	4	1	30,000	220,000	600
Minidoka—										
1900	.....	.....	0	0	0	0	0	0	0	0
1920	2,420	9,250	6	9,000	26	29	10	345,000	3,860,744	12,725
Increase	.....	.....	6	9,000	26	29	10	345,000	3,860,744	12,725
Montana:										
Huntley—										
1900	.....	.....	0	0	0	0	0	0	0	0
1920	603	1,883	8	664	8	6	4	95,000	588,362	1,711
Increase	.....	.....	8	664	8	6	4	95,000	588,362	1,711
Milk River—										
1900	.....	.....	6	1,250	9	6	3	75,000	200,000	600
1920	230	763	15	7,796	38	25	25	765,000	4,500,000	14,000
Increase	.....	.....	9	6,546	29	19	22	690,000	4,300,000	13,400
Sun River—										
1900	.....	.....	2	100	0	2	0	0	0	0
1920	354	861	8	685	17	11	5	110,000	391,121	1,278
Increase	.....	.....	6	585	17	9	5	110,000	391,121	1,278

[1] Data include figures for city of Grand Junction, adjacent to the project, and whose growth has not been affected particularly by the work of the Reclamation Service.

Settlement data—United States Reclamation Service projects, 1900 and 1920.—Contd.

State and project.	Irrigated farms.		Towns.		Number of schools.	Number of churches.	Banks.			
	Number.	Population.	Number.	Population.			Number.	Capital stock.	Deposits.	Depositors.
Montana-N. Dakota:										
Lower Yellowstone—										
1900			2	40	2	1	0	0	0	0
1920	492	1,200	9	2,850	9	15	10	$330,000	$2,331,000	6,500
Increase			7	2,810	7	14	10	330,000	2,331,000	6,500
Nebraska-Wyoming:										
North Platte—										
1900			1	500	23	4	4	70,270	130,089	400
1920	1,300	4,746	14	19,243	284	52	30	844,500	9,017,000	27,324
Increase			13	18,743	261	48	26	774,230	8,886,911	26,924
Nevada:										
Newlands—										
1900			3	30	5	1	0	0	0	0
1920	742	2,523	5	2,830	12	8	2	115,900	864,360	2,500
Increase			2	2,800	7	7	2	115,900	864,360	2,500
New Mexico:										
Carlsbad—										
1900			4	1,500	4	4	2	61,250	150,000	500
1920	363	1,575	4	3,375	13	11	5	325,000	1,049,924	2,617
Increase			0	1,875	9	7	3	263,750	899,924	2,117
New Mexico-Texas:										
Rio Grande [2]—										
1900			25	25,446	27	37	5	255,000	2,022,357	5,625
1920	3,021	12,199	32	95,083	102	105	14	2,990,000	30,898,499	31,716
Increase			7	69,637	75	68	9	2,735,000	28,876,142	26,091
North Dakota:										
North Dakota pumping—										
1900			2	525	2	2	1	10,000	80,000	120
1920	94	194	3	5,000	6	7	3	260,000	2,357,000	5,210
Increase			1	4,475	4	5	2	250,000	2,277,000	5,090
Oregon:										
Umatilla—										
1900			1	200	1	0	0	0	0	0
1920	528	1,280	4	1,230	6	9	1	25,000	317,000	1,200
Increase			3	1,030	5	9	1	25,000	317,000	1,200
Oregon-California:										
Klamath—										
1900			2	900	3	2	1	50,000	180,000	100
1920	542	1,650	5	5,500	21	10	6	595,000	4,500,000	9,250
Increase			3	4,600	18	8	5	545,000	4,320,000	9,150
South Dakota:										
Belle Fourche—										
1900			1	1,200	8	4	1	5,000	300,000	300
1920	1,024	2,650	5	2,350	26	9	9	250,000	2,657,621	6,560
Increase			4	1,150	18	5	8	245,000	2,357,621	6,260
Utah:										
Strawberry Valley—										
1900			10	12,335	19	20	3	150,000	375,000	2,800
1920	2,700	6,500	12	16,000	22	23	6	285,000	2,180,000	9,830
Increase			2	3,665	3	3	3	135,000	1,805,000	7,030
Washington:										
Okanogan—										
1900			3	90	2	0	0	0	0	0
1920	400	1,150	3	1,885	5	8	5	155,000	1,050,100	2,100
Increase			0	1,795	3	8	5	155,000	1,050,100	2,100
Yakima—										
1900			6	8,849	6	9	2	100,000	752,950	2,000
1920	4,245	14,243	19	29,941	50	67	20	1,305,000	15,290,395	34,521
Increase			13	21,092	44	58	18	1,205,000	14,537,445	32,521
Wyoming:										
Shoshone—										
1900			0	0	0	0	0	0	0	0
1920	910	2,730	5	1,345	12	9	6	125,000	644,178	2,605
Increase			5	1,345	12	9	6	125,000	644,178	2,605

[2] Data include figures for city of El Paso whose growth has been due to a number of other causes as well as to irrigation.

Settlement data—United States Reclamation Service projects, 1900 and 1920—Contd.

State and project.	Irrigated farms.		Towns.		Number of schools.	Number of churches.	Banks.			
	Number.	Population.	Number.	Population.			Number.	Capital stock.	Deposits.	Depositors.
INDIAN PROJECTS.										
Montana:										
Blackfeet—										
1900	.....	.....	2	300	0	0	0	0	0	0
1920	351	269	4	3,000	6	8	5	$130,000	$851,600	2,257
Increase	.....	.....	2	2,700	6	8	5	130,000	851,600	2,257
Flathead—										
1900	.....	.....	8	264	1	1	0	0	0	0
1920	1,028	2,380	14	5,445	45	19	11	287,000	1,456,745	4,447
Increase	.....	.....	6	5,181	44	18	11	287,000	1,456,745	4,447
Fort Peck—										
1900	.....	.....	3	231	0	3	0	0	0	0
1920	70	150	5	5,000	5	10	9	225,000	1,700,000	4,700
Increase	.....	.....	2	4,769	5	7	9	225,000	1,700,000	4,700
Totals:										
1900	.....	.....	105	77,602	169	173	45	1,867,370	10,310,686	30,645
1920	32,835	125,214	223	324,289	879	649	247	14,732,663	143,539,856	283,876
Increase	.....	.....	118	246,687	710	476	202	12,865,293	133,229,170	253,231

Within these projects are 223 towns and 32,835 irrigated farms with a total population of 450,000. The substantial development of the towns is indicated by the fact that there are 879 schools, 649 churches, and 247 banks. The banks have a total capital stock of $14,732,663, deposits of $143,539,856, and 283,876 depositors.

The works of the Reclamation Service in 1920 served areas aggregating about 2,845,000 irrigable acres, including 1,662,000 acres for which the Government systems furnished the sole supply of irrigation water and 1,183,000 acres to which in most cases the Service furnished stored water in bulk to supplement the partial supply of private systems otherwise dependent on unregulated stream flow. Of the first class, 1,224,000 acres were actually irrigated and 1,154,000 harvested. Of the other class, from less complete information it is roughly estimated that 982,000 acres were irrigated and 950,900 cropped.

As suggested by the foregoing, the lands served by the works built under the Federal reclamation law may be conveniently considered as of two classes. The first comprises lands for which the United States, under the reclamation act of June 17, 1902, has in general built a complete system of irrigation works from the point of storage to that of delivery to each farm or group of farms, but which in some cases include some old works incorporated in the larger project. These are the lands commonly referred to as included in the Government projects and include those tracts that under Government aid have been converted from sagebrush to productive farms.

The other class of lands benefited by the Government works includes those served under the Warren Act of February 21, 1911 (36 Stat., 925). This important supplement of the reclamation act provides a connecting link between the Government works and private systems built in the same vicinity or drainage basin. The latter commonly lack storage, depending originally on the unregulated flow of

the streams alone. This natural flow often declines in the irrigation season to a point far below the needs of all the constructed canals, and the typical case of service to such canals and lands from the Government works involves furnishing stored water at such times from the reservoirs built by the Reclamation Service. This may be simply delivered in bulk in the river channel, or the service may include carriage through other Government works and delivery at various stages of the process of distributing water to the individual farms. Similarly, the quantities of water made available by the Government works in such cases vary from a complete supply to a small percentage of the total used by the irrigators. Even where only a portion of the total water used is furnished it may be a vital part, and may double the crop yield that would otherwise be secured.

PRODUCTIVITY OF RECLAIMED LANDS.

The arid lands when irrigated are intensively cultivated and yield large crops. In general, it may be roughly stated that the gross crop values on the Government reclamation projects average double those for the United States as a whole. This is indicated by the census figures in the following table:

Average crop values per acre.

Year.	All United States.[1]	Government reclamation projects.[2]	Year.	All United States.[1]	Government reclamation projects.[2]
1910	$15.53	$30.00	1916	$22.10	$38.25
1911	15.26	28.00	1917	32.44	58.40
1912	15.63	25.00	1918	32.92	63.60
1913	16.36	21.50	1919	36.33	79.90
1914	16.36	23.50	1920	23.44	57.35
1915	16.88	24.00			

[1] Source: Bureau of Crop Estimates, United States Department of Agriculture. Figures after 1918 are for 10 crops combined, which comprise nearly 90 per cent of the area in all crops, and the average value of which closely approximates that for all crops.
[2] Source: Annual reports, United States Reclamation Service. Figures refer to lands on Government projects proper

It will be noted that in 1910 the ratio was just about 2 : 1, and in 1920 the ratio was well over 2 : 1, in favor of the Government project lands.

Between these years the ratio first declined and then increased. While the average for the United States was slowly increasing from 1910 to 1915, that for the Government projects was gradually declining. This was due to the fact that the Government works began delivery of irrigation water to a nucleus of well-developed lands that had been under irrigation from private canals for a number of years. The Government works furnished a better supply to these lands, and also brought in large areas of new, raw lands. These raw lands during the first year or two did not attain full production, and this factor was sufficient during the period mentioned to bring down the average return per acre.

The extension of the Government projects continues to bring in such raw lands each year, but the relative weight of this factor becomes less and less each year, and thus with the great increase in prices the curve of average gross crop value for the Government projects

turned upward in 1915, and has since increased more rapidly than that for the United States as a whole.

CROP VALUES.

Since the Government works began delivery of irrigation water the crops produced on the reclaimed lands have exceeded $400,000,000 in value. This includes nothing for the large areas served under the Warren Act and does not include increased values produced as livestock and stock products.

For the lands on what may be called the Government projects proper, as defined above, a crop census for 1920 showed a gross crop value of about $66,200,000, or nearly $58 per acre for the 1,154,000 acres harvested. These figures refer to lands for which the Government works are the sole source of irrigation water and the control of the Reclamation Service commonly extends throughout the system of lateral canals that deliver water to each farmer. Thus, the Service has a force of ditch riders in frequent touch with the irrigators. This provides a ready means for gathering census data of more than ordinary accuracy and at little or no extra expense, since the time for collecting these coincides with that when the water deliveries are dwindling in the fall. The ditch riders, though still required for occasional deliveries, have at that time less onerous duties than during the height of the irrigation season in connection with the operation and protection of the works.

The census reports thus secured for 1920 covered an irrigated area of 1,224,000 acres and 1,662,000 acres that were irrigable; that is, for which the works were prepared to supply water.

The difference between the areas irrigated and cropped, i. e., the acreage irrigated in 1920, but producing no crop that year, includes young fruit trees short of bearing and alfalfa seeded in the fall.

The larger difference between irrigable and irrigated areas does not indicate a failure to utilize 438,000 acres and the water ready for it. A part of this balance on a few of the most easterly projects is cultivated or pastured without irrigation, often combining such operations with the more intensive ones of irrigation on the same farms. Another portion of this balance is public land that, though under ditch, is temporarily withheld from settlement for a seasoning of canals or other action preliminary to inviting in farmers. A small part is public land awaiting entry. Other tracts are State, railroad, or Indian lands more or less in process of subdivision and settlement.

But the largest part of the unirrigated land for which water is ready comprises a great number of small pieces of the irrigated farms. Thus, the figure given as irrigable agrees with the official farm unit plats, and is the total area on which water charges are based, but necessarily a part of this is taken up by the farmers' ditches, buildings, and roads, so that it can not be cultivated. On this account the most complete use of the irrigable area to be ultimately expected will show the irrigation of from 80 to 90 per cent. Also, the new settler of ordinary means can not put his whole unit to use the first year, nor the second, but gradually adds to the area graded, cultivated, and irrigated. For this reason the irrigated area lags behind the irrigable, both increasing each year as new farms are brought under the extended canal systems, and the older ones progress toward complete cultivation.

Irrigation and crop results, Government reclamation projects, 1920.[1]

State and project.	Lands on projects proper covered by crop census.					Other lands served by Government works, usually a partial water supply through private canals under Warren Act contracts.					
	Irrigable acreage.[2]	Irrigated acreage.	Cropped acreage.[3]	Crop value.		Irrigable acreage.	Irrigated acreage.	Cropped acreage.	Crop value.		Approximate percentage of total water used supplied by United States.
				Total.	Per acre.				Total.	Average per acre.	
Arizona:											
Salt River [4]	213,000	[5] 205,060	193,350	$18,551,800	$96.00						
Arizona-California:											
Yuma	67,000	54,550	54,480	3,328,500	61.09	4,000	1,300	1,200	$60,000	$50	100
California:											
Orland	20,530	13,870	11,040	549,700	49.80						
Colorado:											
Grand Valley	35,000	11,730	10,760	525,360	48.80	8,350	7,850	7,700	865,000	112	100
Uncompahgre	100,000	64,180	63,730	3,397,500	53.30	470	470	470	40,600	87	
Idaho:											
Boise	134,000	109,760	100,700	4,653,400	46.20	140,000	127,400	124,400	5,404,000	43	37
King Hill [6]	14,500	4,780	4,520	216,500	47.90						
Minidoka						630,000	575,000	555,000	24,500,000	44	20
Gravity division [7]	72,590	61,520	55,640	1,948,000	35.00						
Pumping division	48,970	46,130	42,940	2,099,200	49.00						
Montana:											
Huntley	31,270	20,020	20,020	543,780	27.10						
Milk River [8]	68,600	24,330	22,330	332,200	14.90	25,300	23,000	21,000	425,000	20	11
Sun River—											
Fort Shaw division [9]	13,750	8,050	8,400	181,600	21.62						
Greenfields division [10]	[11] 26,000	6,730	7,950	112,000	14.08						
Montana-North Dakota:											
Lower Yellowstone	42,170	19,120	19,120	584,700	30.60						
Nebraska-Wyoming:											
North Platte						107,400	88,400	88,400	$1,754,000	$54	
Interstate division	115,000	86,910	85,830	4,043,600	47.10						
N. P. C. & C. Co. lands	15,000	9,630	9,370	382,500	40.80						
Fort Laramie division	16,000	8,530	8,490	253,180	30.00						
Northport division						1,220	1,220	1,220	27,170	22	25
Nevada:											
Newlands	69,310	45,610	44,570	1,279,640	[12] 28.70						
New Mexico:											
Carlsbad	24,990	22,170	20,180	963,800	47.75						
New Mexico-Texas:											
Rio Grande	115,000	82,960	77,880	4,639,200	59.60	53,000	19,000	19,000	630,000	33	98

North Dakota:											
North Dakota pumping	12,000	2,810	2,740	86,780	31.70	.....	.....	.....	.....	.....	.....
Oregon:											
Umatilla	24,620	12,030	10,190	519,470	50.00	.....	.....	.....	.....	.....	.....
Oregon-California:											
Klamath	45,000	38,100	35,260	904,500	25.65	47,000	26,300	26,000	640,000	25	90
South Dakota:											
Belle Fourche	82,630	59,850	59,850	832,200	13.90	52	.....	.....	.....	.....	.....
Utah:											
Strawberry Valley	50,000	32,350	29,250	1,945,900	66.50	18,500	17,000	16,500	1,160,000	70	.....
Washington:											
Okanogan	6,500	5,440	4,920	431,200	87.70	.....	.....	.....	.....	.....	.....
Yakima	.....	.....	.....	.....	.....	148,000	95,000	90,000	9,000,000	.....	.....
Sunnyside division	100,730	93,610	78,940	8,330,400	105.50	.....	.....	.....	.....	.....	.....
Tieton division	32,000	28,000	27,250	3,471,400	127.40	.....	.....	.....	.....	.....	.....
Wyoming:											
Shoshone—											
Garland division	43,300	35,190	34,850	929,100	27.00	.....	.....	.....	.....	.....	.....
Frannie division	22,500	10,460	9,270	134,540	14.50	.....	.....	.....	.....	.....	.....
Total	1,661,960	1,223,480	1,153,820	66,171,650	58.36	[13] 1,183,292	981,940	950,890	47,505,770	50	.....

[1] Data are for calendar year (irrigation season), except on Salt River project data are for corresponding "agricultural year," October, 1919, to September, 1920.
[2] Areas Reclamation Service was prepared to supply water.
[3] Irrigated crops. Excludes small areas on few projects cropped by dry farming.
[4] Data furnished by Salt River Valley Water Users' Association, which operated the project.
[5] Includes 5,536 acres reported as vacant, 3,032 acres of "home tracts," and 3,146 acres within town sites, on which no crop was reported.
[6] Data furnished by King Hill Irrigation District, which operated the project. This was built under private auspices and is under reconstruction by the United States.
[7] Data furnished by Minidoka Irrigation District, which operated the division.
[8] Crop reports covered an additional area of 12,760 acres cropped by dry farming, producing crops worth $102,500, or $8 per acre.
[9] Figures are for 203 irrigated farms, which included small tracts farmed without irrigation. In addition 3 units farmed "dry" reported a value of $900 from 45 acres pastured or cropped.
[10] Figures are for 151 irrigated farms, which included small tracts farmed without irrigation. Pending construction of storage, a full water supply is not available.
[11] Approximate area under ditch. Pending construction of storage, the available water limits area that can be served.
[12] For crops in full production, excluding 9,720 acres of wild-grass pasture and 4,759 acres otherwise not in full production. For all crops, $37.80.
[13] This figure differs from the total for Warren Act contracts at page 23, because some Warren Act areas are omitted here, as works are not completed to serve them, while other Warren Act areas are covered by the crop census and hence are included in the first half of this table.

Summary of crop reports on reclamation projects in 1920.

NOTE.—These figures are limited to irrigated crops covered by crop census on Government projects proper, excluding dry-farm crops and all crops on most areas served stored water under the Warren Act.

Crop.	Acreage cropped.		Yields.			Crop value.		
	Total.	Per cent.	Unit.	Total.	Average per acre.	Average per acre.	Total.	Per cent.
Cereals:								
Barley	23,886	2.0	Bu.	691,247	29	$26.00	$621,310	1.0
Corn	44,180	3.8	Bu.	1,178,574	26	27.36	1,208,821	1.8
Oats	48,765	4.2	Bu.	1,483,819	30	19.28	940,554	1.4
Rye	2,514	.2	Bu.	25,647	10	13.47	33,871	.....
Wheat	136,067	12.0	Bu.	3,258,197	24	39.00	5,252,292	8.0
Total	255,412	22.2	Bu.	6,637,484	26	31.55	8,056,848	12.2
Other grain and seed:								
Alfalfa seed	15,584	1.4	Bu.	56,694	3.6	43.53	676,181	1.2
Clover seed	10,485	.9	Bu.	39,716	3.8	35.00	365,026	.5
Grain sorghum	9,796	.8	Bu.	141,732	14.4	14.05	431,532	.6
Flaxseed	2,262	.2	Bu.	14,417	6.4	10.30	23,278	.....
Millet seed	360	.....	Bu.	3,741	10.4	11.25	4,049	.....
Total	38,437	3.3	Bu.	256,300	6.7	39.00	1,500,066	2.3
Hay and forage:								
Alfalfa hay	432,512	37.4	Ton.	1,352,083	3.1	38.28	16,538,385	25.0
Clover hay	9,249	.8	Ton.	13,747	1.5	10.90	100,797	.1
Other hay	28,484	2.5	Ton.	28,596	1	14.40	408,003	.6
Corn fodder	3,952	.3	Ton.	15,538	3.9	26.00	102,085	.2
Peas	120	.....	Bu.	2,541	21.2	55.65	6,678	.....
Other forage	5,100	.4	Ton.	16,213	3.1	35.04	178,717	.2
Pasture	102,669	9.0	.....	.....	.....	11.65	1,196,758	1.9
Total	582,026	50.4	.....	.....	.....	32.00	18,531,413	28.0
Vegetables and truck:								
Beans	1,282	.1	Bu.	12,803	9.9	35.52	45,531	.....
Onions	767	.....	Bu.	176,715	230	156.40	119,955	.2
Potatoes, white	32,144	2.8	Bu.	6,373,905	198	153.60	4,936,176	7.5
Potatoes, sweet	466	.....	Bu.	55,372	119	190.04	88,559	.1
Truck	16,865	1.5	.....	.....	.....	151.73	2,558,998	3.9
Total	51,524	4.4	.....	.....	.....	150.79	7,769,219	11.7
Fruits and nuts:								
Apples	26,919	2.3	Lb.	156,988,324	5,833	188.83	5,081,979	7.7
Peaches	2,165	.2	Lb.	3,714,650	1,715	77.31	167,393	.3
Pears	4,104	.4	Lb.	12,465,006	3,037	120.35	493,913	.7
Prunes	923	.....	Lb.	3,431,704	3,718	152.06	140,353	.2
Citrus fruits	1,829	.2	Lb.	12,007,800	6,565	360.58	659,510	.9
Small fruit	1,524	.1	Lb.	3,283,656	2,155	278.05	423,752	.7
Miscellaneous	2,193	.2	Lb.	14,532,500	6,627	248.24	544,400	.8
Total	39,657	3.4	Lb.	206,423,640	5,206	189.44	7,511,300	11.3
Miscellaneous:								
Sugar beets	47,160	4.1	Ton.	455,180	9.6	116.33	5,486,251	8.3
Cotton	222,216	19.3	Lb.	50,051,800	225.24	75.90	16,846,414	25.5
Cotton seed			Ton.	61,050	.27			
Cane	2,205	.2	Ton.	7,550	3.4	39.72	87,579	.1
Other crops	4,801	.4	.....	.....	.....	79.70	382,560	.6
Total	276,382	24.0	.....	.....	.....	82.50	22,802,804	34.5
Duplication	89,618	7.7	.....	.....	.....	.....	.....	.....
All crops	1,153,820	100.0	.....	.....	.....	57.35	66,171,650	100.0

WARREN ACT CONTRACTS.

The following table summarizes the special contracts under the Warren Act for the delivery of water to tracts of land in the vicinity of but not primarily integral parts of the reclamation projects.

Contracts under Warren Act.

[Act of Feb. 21, 1911, 36 Stat., 925.]

GRAND VALLEY PROJECT, COLORADO.

Name of contractor.	Date of contract.	Area in acres.	Amount of water.
			Second-feet.
The Mesa County Irrigation District	June 10, 1918	2,400	40
The Palisade Irrigation District	May 31, 1918	6,000	80
Total		8,400	

UNCOMPAHGRE PROJECT, COLORADO.

Satisfaction Title & Investment Co	Aug. 23, 1920	301	5.60
Tobin, Bernard S	Sept. 1, 1920	31	.52
Tripler, J. W	Aug. 26, 1920	129	2.20
Total		461	

BOISE PROJECT, IDAHO.

			Acre-feet.
Black Canyon Irrigation District	Jan. 2, 1918	39,000	(1)
Nampa and Meridian Irrigation District	June 1, 1915	24,557	2,934
Pioneer Irrigation District	Feb. 27, 1913	34,400	17,700
Pioneer Irrigation District and Black Canyon Irrigation District	May 28, 1919	6,000	43,000
Riverside Irrigation District and Big Bend Irrigation District	Feb. 15, 1918	14,385	1,000
Settlers' Irrigation District	Feb. 9, 1918	12,000	1,500
Do	Feb. 18, 1919	420	(1)
Total		130,762	

MINIDOKA PROJECT, IDAHO.

AMERICAN FALLS.[2]			
			Acre-feet.
Aberdeen-Springfield Canal Co	June 15, 1920	75,000	37,500
Blackfoot Irrigation Co	May 7, 1920	15,000	20,000
Burgess Canal & Irrigating Co	May 27, 1920	23,000	5,120
Butte & Market Lake Canal Co	June 2, 1920	18,000	9,000
Churchill, F. H	May 31, 1920	160	500
Corbett Slough Ditch Co	June 3, 1920	7,432	8,000
Enterprise Canal Co. (Ltd.)	June 1, 1920	7,000	6,000
Harrison Canal & Irrigation Co	do	13,000	10,000
Holt, Eugene M	do	60	150
Idaho Irrigation District	do	35,000	25,000
Lenroot Canal Co. (Ltd.)	May 28, 1920	4,000	9,000
Martin Canal Co	May 22, 1920	1,500	750
Murtaugh Canal Co	June 1, 1920	10,000	20,000
New Lavaside Ditch Co. (Ltd.)	May 22, 1920	7,000	4,000
New Sweden Irrigation District	May 27, 1920	23,000	25,000
Paree, Frank	Apr. 23, 1920	124	100
Peoples Canal & Irrigation Co	May 29, 1920	20,000	16,000
Poitevin, Antoine	May 31, 1920	600	1,500
Rudy Irrigation Canal Co. (Ltd.)	May 29, 1920	8,000	2,000
Schodde, Mrs. Minnie	Oct. 26, 1920	293	900
Snake River Valley Irrigation District	May 27, 1920	24,000	20,000
Sunnydell Irrigation District	May 28, 1920	4,400	8,000
Twin Falls Canal Co	Apr. 14, 1920	200,000	100,000
Woodville Canal Co	May 29, 1920	3,000	5,000
Total		[3] 499,569	

[1] Canal capacity, ⅝ inch per acre.
[2] Contracts in connection with construction of American Falls dam; no water furnished.
[3] Not included in grand total, as no water furnished.

Contracts under Warren Act—Continued.

MINIDOKA PROJECT, IDAHO—Continued.

Name of contractor.	Date of contract.	Area in acres.	Amount of water.
JACKSON LAKE.			
			Acre-feet.
Aberdeen-Springfield Canal Co	June 4, 1917	65,000	40,000
American Falls Canal Securities Co. (assigned to Aberdeen-Springfield Canal Co.)	Dec. 28, 1917	7,000	2,685
Bradbury, W. A., and J. C. McMullen	Apr. 23, 1917	280	200
Burgess Canal & Irrigating Co	Mar. 28, 1917	23,000	5,120
Enterprise Canal Co. (Ltd.)	Apr. 15, 1917	7,000	6,100
Farmers' Friend Irrigation Co	June 18, 1917	10,000	2,000
Gooding, F. R. (temporary)	July 10, 1920	.....	2,995
Harrison Canal & Irrigation Co	Apr. 5, 1917	13,000	5,000
Holt, M. Eugene	Aug. 2, 1920	60	16
Kuhn Irrigation & Canal Co. and Twin Falls Canal Co	Feb. 25, 1913	410,000	400,000
Lenroot Canal Co. (Ltd.)	July 27, 1917	4,000	3,000
Lowder Slough Canal Co. (Ltd.)	Apr. 15, 1917	1,300	1,040
Lyle, W. S	.....do.....	160	155
Martin Canal Co	.....do.....	1,500	1,500
Murtaugh Canal Co	July 9, 1920	10,000	600
Do	July 23, 1920	10,000	300
New Sweden Irrigation District	June 29, 1917	27,000	5,000
Peoples' Canal & Irrigation Co	Apr. 15, 1917	20,000	8,000
Poplar Irrigation District	May 1, 1917	1,200	1,200
Rudy Irrigation Canal Co	.....do.....	8,000	2,000
Skalet, O. O. (temporary)	Aug. 2, 1920	.....	60
Snake River Valley Irrigation District	Aug. 11, 1917	24,000	15,000
Sunnydell Irrigation District	June 8, 1917	4,400	4,000
Twin Falls Canal Co	Aug. 3, 1920	200,000	20,000
Vance, S. E. (temporary)	July 24, 1920	.....	1,560
Do	Aug. 17, 1920	.....	305
Total	.....	846,900	.....

NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

			Acre-feet.
Beerline Irrigation Canal Co	July 3, 1918	1,113	1,639
Brown's Creek Irrigation District	July 14, 1913	7,784	19,900
Central Irrigation District	Mar. 6, 1913	1,501	4,050
Chimney Rock Irrigation District	.....do.....	3,916	10,300
Gering Irrigation District	Jan. 17, 1913	14,243	35,500
Tri-State Land Co. (Farmers' Irrigation District)	Aug. 20, 1912	60,000	180,000
Bridgeport Irrigation District	June 14, 1915	17,434	37,478
Goshen Land Co. (and Lingle Water Users' Association)	July 1, 1915	9,877	32,853
Pleasant Valley Lateral Association	June 16, 1915	3,762	13,522
Lincoln Land Co	Apr. 17, 1917	954	1,941
Lingle Water Users' Association	Sept. 1, 1920	2,151	3,389
Total	.....	122,135	.....

KLAMATH PROJECT, OREGON-CALIFORNIA.

			Acre-feet.
Pine Grove Irrigation District	Dec. 21, 1918	954	1,908
Horsefly Irrigation District	July 10, 1919	4,400	8,800
Enterprise Irrigation District	Oct. 5, 1920	2,980	5,960
Total	.....	8,334	.....

BELLE FOURCHE PROJECT, SOUTH DAKOTA.

Beyer Aune and Bessie Hull Aune	May 2, 1918	36.8	.....
Thos. G. Wall and Irma D. Wall	May 29, 1919	18.0	.....
Total	.....	54.8	.....

Contracts under Warren Act—Continued.

STRAWBERRY VALLEY PROJECT, UTAH.

Name of contractor.	Date of contract.	Area in acres.	Amount of water
			Acre-feet.
Hayes, John H., et al	June 8, 1916	20	20
Mapleton Irrigation District	Jan. 2, 1918	4,000	3,600
Do	Apr. 5, 1919	4,000	1,108
Do	Oct. 28, 1919	4,000	467
Spanish Fork South Irrigation Co	Mar. 24, 1918	5,000	12,500
Springville Irrigation District	Dec. 29, 1917	6,000	2,400
Do	Apr. 9, 1920	6,000	2,000
Whiting, P. E., et ux	June 8, 1916	40	40
Total		29,060	

YAKIMA PROJECT, WASHINGTON.

			Acre-feet.
Sunnyside Irrigation District	Oct. 6, 1914	4,630	18,520
Snipes Mountain Irrigation District	Nov. 16, 1914	1,915	5,266.25
Outlook Irrigation District	Nov. 23, 1914	4,741.27	14,508
Union Gap Irrigation District	Mar. 2, 1915	1,500	4,222
Grandview Irrigation District	Aug. 4, 1916	3,994	10,983.50
Prosser Irrigation District	Dec. 1, 1917	2,140	6,420
W. O. Bradbury	May 22, 1916	18	54
Naches-Selah Irrigation District	Apr. 6, 1920	10,612	4,486
Yakima Valley Canal Co	June 2, 1920	4,300	4,300
Selah-Moxee Irrigation District	Nov. 15, 1920	6,000	3,000
Kittitas Reclamation District	Feb. 16, 1921	70,000	260,000
Kennewick Irrigation District	Apr. 7, 1921	35,000	150,000
Total		144,850.27	
Grand total		[1]1,290,909.27	

[1] This figure differs from the total of the seventh column in the table at page 19 because for some of the areas covered by Warren Act contracts irrigation works are not completed, and hence they are not included in the other table, while other Warren Act areas are covered by crop census, and hence are included in the second column of the table at page 19.

RECLAMATION PROJECT OPERATIONS.

The Salt River project, in Arizona, is being operated by the local organization of water users under a contract by which the Secretary of the Interior turned over the works and the income of the large power plants which were constructed in connection with the project. The Government's connection with this project is confined to occasional inspection and supervision, as provided in the contract. The ground water is rising on the project and will require early attention in order to prevent injury to a considerable area of land. This condition has been investigated by the water users' association, and plans are now under way to provide for drainage on certain low areas of the project. Several wells and drains have already been installed and put in operation.

On the Yuma project, Arizona-California, the Yuma Valley, which lies in Arizona, has been placed under public notice, but the payments are being contested by the water users' association. Decree was rendered in favor of the United States, but the association appealed and final decision has not yet been rendered. The Yuma Valley is in general very progressive, and notwithstanding the depression resulting from adverse market conditions in 1920, considerable progress in development was made; several public and private enterprises were completed, and farm lands are being offered for sale at from

$200 to $500 per acre. The Yuma Auxiliary project was created by special act of Congress of January 25, 1917. Public notice providing for the sale of public lands of the First Mesa Division of this project was issued on October 3, 1919, and of the 532 farm units in the First Mesa Division 518 have been sold, involving a gross area of 6,086 acres. The pumping plant and certain other features of this division have been partially completed.

The Orland project, in California, is regarded as the first division of a comprehensive project for the development of the Sacramento River. It is, however, an independent project, obtaining its own water supply from Stony Creek, a tributary of the Sacramento River, and is practically completed. Public notice on this project issued in 1916 and all payments are made promptly when due by the association as a whole. The project is prosperous and is constantly growing in development, although an extreme drought and poor market conditions during the past year made a considerable reduction in the project returns and some losses were experienced in certain crops.

The Grand Valley project, in Colorado, is delivering water on a rental basis, as public notice has not yet been issued. The conditions on the project are showing a steady development and the majority of the settlers now have their farms on a paying basis. Twenty-one thousand acres are now under rental contract. There remain to be completed the last seven miles of the main canal, laterals to serve 5,000 acres of the gravity division, the power and pumping systems, and such drainage and flood-protection works as may be required.

The Uncompahgre project, Colorado, is being operated on a rental basis under contract with the water users' association. The contract provides that the operation of the project may be turned over to the association whenever they so elect, and also provides for operation on a rental basis for a period of five years, at the end of which period, namely, on December 1, 1922, the project is to be opened under public notice and construction payments will begin. The project is practically completed except for the possible enlargement and improvement of some of the distribution systems which are now owned and operated by the farmers. Water is being furnished on a continuous-flow basis, with its resultant waste and aggravation of the seeped areas. Efforts are being made to change the system of delivery to the acre-foot basis. The project is developing slowly but steadily and the settlers are on the whole in a prosperous condition.

The Boise project, in Idaho, includes the Arrowrock and Deer Flat Reservoirs, which have been completed, and a canal system which now delivers water to the main body of the project. The project as now planned is practically completed except for the drainage system. Public notice was issued in 1917 announcing the charges on the completed portions of the project. In addition to the main project, the United States, under special contracts, delivers storage water to about 150,000 acres of lands that are served by independent systems. The full storage capacity of both the Arrowrock and Deer Flat Reservoirs was available during the irrigation season. The project as a whole is in a prosperous condition.

The King Hill project, in Idaho, is being reconstructed under the terms of the contracts entered into with the King Hill Irrigation Dis-

trict. The total of the reconstruction work involved amounts to $1,600,000, which work is being accomplished during the nonirrigation seasons. The project is being operated and maintained by the Reclamation Service for the district. The climate is favorable for the early marketing of produce and as a result the settlers are in a fairly prosperous condition.

The Minidoka project, in Idaho, as originally planned, has been completed, but several extensions are desirable and preliminary surveys are under way in connection with the irrigation of a large acreage under the North Side Pumping Division. The construction of the American Falls Reservoir will make additional water available for increased areas under this project as well as supplying other projects along the Snake River. The project at present consists of two divisions, the Gravity Division and the Pumping Division. The Gravity Division is operated by an irrigation district under contract with the United States and the Pumping Division on the south side of the river is operated by the United States. The water supply has been sufficient during the past year.

The Huntley project is one of the most thickly settled projects of the service. The project is practically complete except for drainage works. The water supply was ample throughout the season and crops were in excellent condition.

In the Lower Yellowstone project, Montana and North Dakota, two irrigation districts have been formed, one embracing Montana lands and the other North Dakota lands. The project has been constructed for 42,000 acres and the contracts with the districts provide for its completion to cover an additional area of 17,000 acres. Water was supplied during the past season under these contracts, which provide that the operation and maintenance cost each year shall be repaid by the districts. The project is showing a steady but not rapid development.

In the Milk River Valley, Montana, a supplemental supply of water is obtained from the St. Mary Storage Division for use on the Milk River project. No lands are irrigated within the Storage Division. Both the Storage Division and the Milk River project are still in the process of construction and all water used for the irrigation of lands in the Milk River project is furnished on a rental basis. The water supply available during the season was sufficient for the lands now under irrigation. Seepage has developed on some of the lands adjacent to Nelson Reservoir and under the various canals, in all affecting about 1,500 acres, and the matter is now under investigation.

On the Sun River project, Montana, the Fort Shaw Division on the south side of the Sun River is practically completed and is being operated under public notice, while water is being delivered to the Greenfields Division on a rental basis. Damage by cutworms, together with low prices in 1920, left the farmers in poor financial condition, but there is good prospect for an excellent yield in 1921.

The North Platte project, in Nebraska and Wyoming, is one of the largest, as well as one of the most successful, of the reclamation projects. The Interstate Division, on the north side of the North Platte River, is being operated under public notice and the settlers thereunder are in a prosperous condition. The construction work on this division is practically completed except for the completion of the drainage system. The Fort Laramie Division, on the south side of

the river, is under construction and certain areas of the division are being furnished water on a rental basis. About 5,100 acres of additional lands under this division were thrown open to entry during the spring of 1920, and the development of the division is keeping pace with its construction. An opening of 224 additional farm units on the North Platte project, of which 20 are in the Interstate Division and 204 in the Fort Laramie Division, was held on September 9, 1921. Three thousand four hundred and thirty-six applications for these farms were filed by ex-service men, representing 36 States, the District of Columbia, and Canada; 90 per cent of the winning applicants have had previous farming experience.

The Newlands project, in Nevada, is being operated under public notice and about 72,000 acres can now be irrigated. The irrigation plan involves diversion from the Truckee and Carson Rivers, supplemented by storage in the Lahontan and Lake Tahoe Reservoirs. The features remaining for future construction are the Spanish Springs Reservoir, the extension of the irrigation system to cover additional areas, and the extension of the drainage system which is being constructed under contract with the Truckee-Carson Irrigation District. During the past year there was an abundant water supply for all project lands, with the exception of about 5,000 acres which are dependent upon the natural flow of the Truckee River and such storage as the United States may be able to obtain from Lake Tahoe. The settlers on this project are making good progress in development, although the unfavorable hay market has resulted in some financial stringency during the past year.

The Carlsbad project, in New Mexico, is being operated under public notice and about 22,000 acres were irrigated during the season of 1920. Additional areas in the Pecos River Valley are now being considered as possible extensions. The project is showing a steady development year by year, although the adverse market conditions of the past season have seriously handicapped many of the farmers.

The Rio Grande project, in New Mexico and Texas, is being operated on a rental basis and consists of about 150,000 acres, of which 109,000 can now be supplied with water. The plan of irrigation involves diversion from the Rio Grande, supplemented by storage in the Elephant Butte Reservoir. The flat topography of the valley, the character of the soil, and wasteful use of water in the past have caused a considerable portion of the land to be damaged by seepage. A drainage system is now under construction involving 350 miles of deep open drains, which is about 60 per cent complete. Construction payments on about 85,000 acres are provided in an order signed by the Secretary on December 11, 1920. This project is in a fairly prosperous condition, notwithstanding the adverse market conditions of the past year.

The North Dakota Pumping project has been constructed for about 8,000 acres. The irrigation plan involves pumping from the Missouri River in the vicinity of Williston, N. Dak., in two lifts aggregating about 80 feet above the river. The project is being operated under contract with the Williston Irrigation District providing for operation and maintenance on a rental basis, but owing to adverse conditions development has not been rapid.

The Umatilla project, in Oregon, is being operated under public notice and consists of a total area of 28,300 acres, of which the Service

is now prepared to supply about 24,400. Difficulties are encountered with drifting sand and the porous character of the soil in certain areas which demand large quantities of water and do not respond readily to irrigation. Two irrigation districts have been formed and all lands included therein. Good progress was made on the lining work of the East Side Main Canal in order to prevent excessive losses. The settlers are making fair progress in development of the project lands.

The Klamath project, in Oregon and California, is being gradually extended as the waters of Tule Lake recede owing to evaporation and the prevention of inflow. A certain portion of the Tule Lake lands is included in the Third Division and the balance is being leased pending the completion of the irrigation system. A drainage system has been constructed for about 29,000 acres and the results obtained have been satisfactory. The principal construction work during the year consisted of extensions to the canal and lateral system. The construction of the dam and main canal for the Tule Lake Division was also begun. The irrigated land is productive and the settlers are making good progress in development with good prospects for the season of 1921.

The Belle Fourche project, in South Dakota, is being operated under public notice. The water supply was sufficient, irrigation being light on account of excessive spring rains. Construction is under way on an extension of the project in the Willow Creek District. Drainage is badly needed in certain sections, but no work was accomplished, as arrangements have not yet been made for the repayment of the cost. Development was slow owing to the financial depression and adverse market conditions, but on the whole the project is showing good results.

On the Strawberry Valley project, in Utah, the principal works constructed by the Reclamation Service are a large storage reservoir on the Strawberry River and 4-mile tunnel through which the storage water is diverted to the western slope of the Wasatch Range, and a distribution system in the Spanish Fork Valley. The irrigation system has been completed and is being operated by the various districts under special contracts. The operation of the power canal is carried on by the Service and the power developed is being sold to the various towns and project industries. The settlers are in a prosperous condition and the payment of the construction charges is being made regularly and promptly.

The Okanogan project, in Washington, experienced a severe water shortage in 1920, causing a considerable reduction in the area irrigated. This shortage has continued for three seasons and the supply in 1920 was augmented by pumping from the Okanogan River and from wells. The construction of the Salmon Lake Dam was continued during the year and the Conconully Dam enlargement was practically completed. Much better crop results are predicted for 1921.

The Yakima project, in Washington, includes six storage reservoirs and seven irrigation divisions. Four storage reservoirs are completed and the irrigation systems for the Sunnyside and Tieton Divisions are also practically completed and water is being furnished under public notice. Construction plans and surveys have been completed for three additional divisions. The principal construction work during the year consisted of excavation of outlet tunnel and

corewall trench and stripping of the dam site for the Tieton Reservoir. The Yakima project is one of the foremost in general prosperity and the returns per acre for the past year were exceptional in view of the generally low prices for farm products.

The Riverton project, in Wyoming, consists of about 100,000 acres of irrigable land in Fremont County. The irrigation plan provides for a water supply from the Wind River, supplemented by storage in Pilot Butte, Dinwoodie Lake, and Bull Lake reservoirs. The principal work in progress during the year consisted of the excavation of about 3½ miles of main canal and the completion of the topographic surveys of the project. No part of the project has yet been put under irrigation. The Midvale Irrigation District, in connection with this project, was organized June 1, 1921.

The Shoshone project, in Wyoming, is still on a construction basis except that certain divisions of the project are completed and being operated under public notice. The project is gradually being extended by the construction of additional works. Drainage work was continued throughout the year and has been uniformly successful. The principal construction work undertaken during the fiscal year, in addition to drainage, consisted of a power plant at Shoshone Dam, which work was started in November, 1920, and which is still in progress, and the extension of the lateral system to new lands. On September 16, 1921, there were opened to entry 57 farm units in the Garland and Frannie Divisions, practically all of which were entered by ex-service men on that date or shortly thereafter.

Four extremely dry years, 1917 to 1920, inclusive, throughout a large portion of the West have broken all records for drought and many private irrigation projects have suffered for lack of water. Dry farming in most sections has proved an absolute failure. Numerous cloudbursts and floods have brought considerable damage to many private irrigation projects in the West, and some damage to Government projects has been caused.

SUMMARY OF CONSTRUCTION RESULTS.

The following table gives in concise form a review of the work done by the Service to June 30, 1921. During the fiscal year the amount of excavation totaled more than 9,380,000 cubic yards.

Summary of construction results, June 30, 1921.

Items.	To June 30, 1921.	To June 30, 1920.	Increase.
Reservoir capacity available (original)	*Acre-feet.* 9,610,423	*Acre-feet.* 9,441,910	*Acre-feet.* 168,513
CANALS, DITCHES, AND DRAINS.	*Miles.*	*Miles.*	*Miles.*
Canals over 800 second-feet capacity	472	457	15
Canals 301 to 800 second-feet capacity	678	678	.....
Canals 50 to 300 second-feet capacity	2,036	1,975	61
Canals less than 50 second-feet capacity	8,072	7,939	133
Total canals	11,258	11,049	209
Waste-water ditches	732	700	32
Drains, open	867	737	130
Drains, closed	189	179	10
Total	1,788	1,616	172
Grand total	13,046	12,665	381

Summary of construction results, June 30, 1921—Continued.

Items.	To June 30, 1921.		To June 30, 1920.		Increase.	
TUNNELS.	*Miles.*		*Miles.*		*Miles.*	
Number	96		95		1	
Length (feet)	144,429		143,847		582	
STORAGE AND DIVERSION DAMS.	*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Masonry	2,089,096		2,088,251		845	
Earth	10,669,414		10,531,663		137,751	
Rockfill and crib	1,211,499		1,207,381		4,118	
Total	13,970,009		13,827,295		142,714	
DIKES AND LEVEES.	*Feet.*	*Cu. yds.*	*Feet.*	*Cu. yds.*	*Feet.*	*Cu. yds.*
Length and volume	601,914	4,576,891	514,039	4,518,214	87,875	58,677
	Concrete.	Wood.	Concrete.	Wood.	Concrete.	Wood.
CANAL STRUCTURES.						
Costing over $2,000	1,153	209	1,081	209	72	.....
Costing $500 to $2,000	2,572	658	2,134	605	438	53
Costing $100 to $500	11,225	6,924	10,327	6,345	898	579
Costing less than $100	20,519	65,422	19,682	62,130	837	3,292
Total	35,469	73,213	33,224	69,289	2,245	3,924
Grand total	108,682		102,513		6,169	
	Number.	Length.	Number.	Length.	Number.	Length.
BRIDGES.		*Feet.*		*Feet.*		*Feet.*
Steel	106	8,579	106	8,579	.....	.....
Combination	414	12,542	414	12,542	.....	.....
Wood	6,862	155,531	6,424	143,600	438	11,931
Concrete	352	4,664	349	4,543	3	121
Total	7,734	181,316	7,293	169,264	441	12,052
CULVERTS.						
Concrete	2,125	106,310	2,038	101,176	87	5,134
Metal	1,761	61,810	1,617	57,042	144	4,768
Terra cotta	1,556	66,362	1,556	66,362	.....	.....
Wood	4,189	101,801	4,189	101,801	.....	.....
Total	9,631	336,283	9,400	326,381	231	9,902
PIPE.	*Linear feet.*		*Linear feet.*		*Linear feet.*	
Concrete	683,497		640,334		43,163	
Metal	259,821		251,659		8,162	
Terra cotta (tile)	1,384,725		1,316,872		67,853	
Wood	505,928		499,472		6,456	
Total	2,833,971		2,708,337		125,634	
	Number.	Length.	Number.	Length.	Number.	Length.
FLUMES.		*Feet.*		*Feet.*		*Feet.*
Concrete	92	45,125	90	38,978	2	6,147
Metal	1,061	174,734	967	166,177	94	8,557
Wood	2,351	471,464	2,250	463,209	101	8,255
Total	3,504	691,323	3,307	668,364	197	22,959
	Concrete.	Wood.	Concrete.	Wood.	Concrete.	Wood.
CANALS LINED.						
Length (miles)	353.94	4.11	333.88	4.11	20.06	.....
Total	358.05		337.99		20.06	

Summary of construction results, June 30, 1921—Continued.

Items.	To June 30, 1921.		To June 30, 1920.		Increase.	
BUILDINGS.	*Number.*		*Number.*		*Number.*	
Offices	99		99		.....	
Residences	681		659		22	
Power plants	31		31		.....	
Pumping stations	136		118		18	
Barns, storehouses, etc	551		543		8	
Total	1,498		1,450		48	
WELLS.	Number.	Depth.	Number.	Depth.	Number.	Depth.
Number and depth	532	51,474	499	49,162	33	2,312
COMMUNICATIONS.	*Miles.*		*Miles.*		*Miles.*	
Roads	996		986		10	
Railroads	83		83		.....	
Telephone lines	3,269		3,145		124	
Transmission lines	714		650		64	
Total	5,062		4,864		198	
POWER DEVELOPED.						
Water and steam horsepower	60,373		60,373		.....	
EXCAVATION.	*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Class 1, earth	168,588,794		159,876,598		8,712,196	
Class 2, indurated material	10,656,971		10,175,545		481,426	
Class 3, rock	8,787,724		8,599,998		187,726	
Total	188,033,489		178,652,141		9,381,348	
RIPRAP (cubic yards)	2,073,073		2,001,420		71,653	
PAVING (square yards)	889,084		832,736		56,348	
CONCRETE (cubic yards)	3,092,888		3,047,045		45,843	
CEMENT (barrels)	3,078,892		3,015,375		63,517	

DRAINAGE.

Description of investigations on drainage work in progress will be found under the discussion of projects. Reference is also made to previous annual reports, especially the twelfth, thirteenth, fourteenth, and sixteenth, for discussion of the causes of seepage and water-logging and the remedies necessary to reclaim and protect the lands from damage. During the period from July 1, 1920, to June 30, 1921, important drainage work was done on the Rio Grande, Boise, North Platte, Grand Valley, and Shoshone projects. The drainage system on the Rio Grande project, which is the largest so far undertaken by the Reclamation Service, is now estimated to be about 60 per cent complete. All seeped lands affected by drains have been reclaimed and are now producing crop. Work will soon be started on an extensive deep drainage system for the Newlands project, the district court having decided favorably on the apportionment of benefits and confirmed the contract. The drainage of the Grand Valley project, which has been under construction for the past four years, is practically complete. As shown by the accompanying table, approximately 123 miles of open drains and 6.5 miles of closed drains were constructed during the past year. Thirty-four excavating machines were operated by the Reclamation Service, and 4,614,121 cubic yards of excavation removed.

Summary of drainage work for period July 1, 1920, to June 30, 1921.

Project.	Miles of drain.		Number of machines operated.	Excavation.[1]
	Open.	Closed.		
Yuma	6.0	.....	2	305,550
Grand Valley	20.8	0.2	4	571,677
Boise (Riverside and project)	8.73	.....	3	362,753
Huntley	.....	1.25	2	6,700
North Platte	[2] 21.72	1.01	6	707,380
Rio Grande	32.6	.....	7	1,764,446
Klamath	10.4	.....	1	162,205
Shoshone	22.78	4.06	9	733,410
Total	123.03	6.52	34	4,614,121

[1] Excavation does not include back fill.
[2] 13.06 miles are outlet drains.

The data relative to areas protected or to be protected by drains when completed are dependent on many factors. It is impossible in advance of complete irrigation over a given area to foretell with certainty what portion may become seeped and waterlogged. The amount of water used and the manner in which it is applied to the soil are important factors in influencing the spread of seepage. These are dependent upon the skill and care of the irrigator. The natural drainage of different soils can be only roughly approximated, yet it is of great importance in preventing the rise of ground water. On account of this and other equally indeterminable factors, the estimate of seepage and summary of drainage work to June 30, 1921, as shown by the accompanying table, should be regarded as expressions of opinion rather than accurate engineering determinations. It will be noted from this table that approximately 1,225 miles of deep drains have been constructed to date to protect and reclaim lands from seepage which have been placed under irrigation by the Reclamation Service. This indicates the importance of drainage work as a feature of irrigation reclamation.

It is desired to call attention to the outlet channels necessary to dispose of drainage water on the North Platte project. Most of the seeped areas on this project are in basins isolated from the river, into which the drains discharge and it is necessary to construct long outlet channels to carry this water to the river. These channels are not effective as deep drains except for a small area on each side of them. Most of them have been constructed through private irrigation districts under cooperative contracts. It is extremely difficult, under a situation like this, to make a big showing with the drains.

Estimate of seepage and summary of drainage work to June 30, 1921.

State and project.	Constructed drains.[1] Open.	Constructed drains.[1] Closed.	Estimated area damaged by seepage on June 30, 1921.	Estimated area protected by constructed drains.	Estimated area that will be protected when all drains authorized have been constructed.
Arizona-California:					
Yuma—	*Miles.*	*Miles.*			
Bard and Indian	11.70	4.00	1,000	8,000	8,000
Yuma Valley	24.10	.....	1,600	25,000	30,000
Colorado:					
Grand Valley—					
Project lands	13.30	.....	500	1,500	2,000
Grand Valley Drainage District	37.50	1.00	30,000	9,000	10,000
Teller Institute	2.80	.....	200	300	300
Frey Drain	1.60	.....	100	300	300
Uncompahgre	.....	.....	16,000	.....	.....
Idaho:					
Boise—					
Riverside Irrigation District	44.10	.....	350	11,400	11,400
Pioneer Irrigation District	78.50	.40	300	30,000	30,000
Nampa Meridian District	43.70	.....	500	50,000	50,000
Other parts	10.53	.10	6,000	3,500	10,000
King Hill [2]	.30	.....	.....	600	600
Minidoka (Gravity Division)	109.00	.....	560	30,000	30,000
Montana:					
Flathead (Indian)	.18	2.97	640	1,240	1,240
Huntley	16.00	50.50	1,300	21,000	24,000
Milk River—					
Malta Division	.....	.....	1,430	.....	.....
Glasgow Division	.....	.....	65	.....	.....
Sun River—					
Fort Shaw Division	.....	.....	2,455	.....	.....
Greenfields Division	.....	.....	200	.....	.....
Montana-North Dakota:					
Lower Yellowstone	4.50	1.10	1,600	1,600	1,600
Nebraska-Wyoming:					
North Platte—					
Interstate Division	49.42	14.18	2,600	5,440	8,200
Interstate Division [2, 3]	18.17	.....	.....	.....	.....
Fort Laramie Division	22.75	.....	350	.....	15,600
Northport Division	.48	.....	.....	.....	3,000
Nevada:					
Newlands—					
Carson Division	13.11	3.99	12,000	15,340	62,816
Truckee Division	3.45	.....	100	600	4,448
New Mexico:					
Carlsbad	11.14	3.65	5,500	5,031	5,031
New Mexico-Texas:					
Rio Grande—					
Mesilla Valley	126.20	.....	20,000	51,400	75,000
Montoya [2]	6.60	.....	3,000	1,000	3,000
El Paso Valley	69.30	.....	11,000	31,400	47,000
Rincon Valley	7.10	.....	10,000	3,300	17,000
Tornillo District	2.60	.....	5,000	1,400	8,000
Oregon:					
Umatilla	10.00	.....	300	2,000	2,000
Klamath	98.70	8.00	2,000	28,686	29,686
South Dakota:					
Belle Fourche	.....	.....	3,570	.....	.....
Washington:					
Yakima [2]—					
Sunnyside Division	76.06	78.36	10,000	48,400	49,510
Tieton Division	6.80	1.20	200	2,068	2,068
Wyoming:					
Shoshone—					
South Garland	22.94	89.05	1,000	25,300	26,000
North Garland	12.56	2.27	4,000	3,680	8,000
West Garland	1.00	.88	400	400	600
Frannie—First Division	7.95	.....	1,000	1,600	2,000
Total	964.14	261.65	139,220	420,485	578,399

[1] Surface drains and waste ditches not included.
[2] Constructed by landowners.
[3] This represents outlet channels built by landowners under cooperative contracts. In addition to this the United States built 15.5 miles of outlet channels under cooperative contracts, which is included in the total of 49.42 shown in the table.

ELECTRICAL AND MECHANICAL ENGINEERING.

The electrical and mechanical engineering section of the Denver office designs and supervises the construction and operation of the power and pumping plants of the Service. It is also available for consultation in regard to electrical and mechanical matters. The work of this section has been increased during the year by new construction and extensive studies of proposed works including the Shoshone power system construction, American Falls negotiations, studies of the Hillcrest, Thomas Point, Black Canyon, Boulder Canyon, San Carlos, Guernsey, Lower Rio Grande, and Spanish Springs developments. Consideration has also been given to the standardization of practice in the construction and operation of transmission lines, power plants, pumping plants, and telephone systems. At the close of the fiscal year the force consisted of 13 designers and engineers and 1 clerk under the direction of the electrical engineer. In addition to routine duties the following work was accomplished during the year ended June 30, 1921:

Yuma project, Arizona.—Studies were made of the power rates of the Southern Sierras Power Co. and the effect of these rates to the cost of pumping on the Mesa Division estimated. The Valley Drainage plant was inspected and arrangements made for necessary repairs. Purchase of equipment and materials and detail drawings for the B Lift pumping plant, Mesa Division, were completed.

Boise project, Idaho.—The Boise power plant, under lease to the Electrical Investment Co. for the past five years, was inspected, preparatory to resumption of operation of the plant by the Reclamation Service at the termination of the lease. Specifications and preliminary designs for the Hillcrest pumping plant were completed. Studies were made of the proposed direct pumping plant at Black Canyon Dam, and preliminary designs and estimates prepared.

Minidoka project, Idaho.—Extensive studies were made and curves prepared showing the amount of power available at American Falls in connection with the proposed American Falls Dam. Preliminary designs for power development at American Falls were prepared. Technical assistance was given in the negotiations with the Idaho Power Co. for the acquisition of property and rights for American Falls Reservoir. Advice was given in connection with the proposed increase in capacity of the South Side pumps. Specifications for equipment for Miller substation at Burley were issued and detail construction drawings prepared.

Huntley project, Montana.—Designs were prepared for a crane runway for the auxiliary pumping plant, and a crane purchased, to facilitate repairs to machinery.

Lower Yellowstone project, Montana-North Dakota.—Preliminary designs and specifications for the Thomas Point pumping plant were completed.

North Platte project, Nebraska-Wyoming.—Specification and detail drawings were prepared covering the purchase and installation of two additional drainage pumping plants for Dutch Flats. Assistance was given in the correction of transmission line troubles on the Northport Division. Designs were prepared for an auxiliary outlet in the North Tunnel, Pathfinder Dam, for supplying water to Casper and other towns during the nonirrigation season. An inspection

was made of the steel line conduits in South Tunnel, Pathfinder Dam, and provision made for necessary repairs. Studies were made of the proposed installation of an elevator at Pathfinder Dam. Preliminary designs and estimates of cost of construction and operation of power development at Guernsey Dam were prepared, and studies made of the power market and probable demands and rates for sale of power. Detail drawings were prepared of repair parts for the needle valves in Minatare Dam.

Newlands project, Nevada.—Preliminary designs and estimates were prepared for power development at Spanish Springs Dam, and for the Nevada Valleys Power Co.'s Ditho site on Truckee River. A valuation was made of the Reno Light & Power Co.'s power plant, canal, penstocks, and diversion dam, in connection with the proposed increase in storage for the project. The power plants of the Truckee River General Electric Co. were tested and technical assistance given in the Truckee River adjudication suit, involving these plants.

Rio Grande project, New Mexico-Texas.—Estimates of cost of pumping system for Palomas Valley were revised. Specifications and drawings were prepared of new pistons for the 60-inch balanced valves at Elephant Butte Dam. Drawings were prepared for a hydraulic plant for excavating a spillway channel at Elephant Butte Dam.

North Dakota pumping project.—An inspection was made of the power and pumping plants and recommendation for minor improvements made.

Klamath project, Oregon-California.—Estimates were prepared covering alternative designs of a pumping plant for draining Ryan Sump.

Strawberry Valley project, Utah.—Designs were prepared for new oil-thrust bearings for the two exciter units in Spanish Fork power plant.

Okanogan project, Washington.—Detail drawings were prepared and purchase of materials completed for the installation of the Robinson Flat substation. Assistance was given in the preparation of a contract with the Okanogan Valley Power Co. for the purchase of electric current for operating Robinson Flat pumping plant. Preliminary drawings and estimates of cost of construction and operation of power development at McLaughlin Canyon and an electrically operated pumping plant at Omak were prepared.

Shoshone project, Wyoming.—Specifications were prepared for generating equipment for Shoshone power plant, emergency valves for Shoshone Dam, and aluminum conductors for 46½ miles of transmission line. Progress was made in preparation of detail drawings for foundations, tunnel, and discharge valve installation at Shoshone power plant. Studies were made of the power market and the probable demands and rates for the sale of power. Assistance was given in the preparation of plans for an electric distributing system for the town of Powell. Designs were prepared for a regulating valve to be used as an auxiliary outlet at the Shoshone Dam.

Secondary projects.—In connection with studies of the Lower Rio Grande project, comparative estimates of cost of construction and operation of pumping systems for three different proposed plans were prepared. Preliminary designs and estimates of cost of construction and operation of a power and pumping system for the San Carlos project, Arizona, were prepared, covering a hydroelectric power

plant at San Carlos Dam, 223 miles of transmission line, 10 substations, and 297 small pumping plants. In connection with studies of storage at Boulder Canyon, Colorado River, preliminary designs and estimates of cost of construction and operation of power development were prepared, covering alternative locations for the power plant.

POWER DEVELOPMENT.

The following tables show the results of pumping and power operations during the fiscal year:

Pumping plants operated by the United States Reclamation Service during the fiscal year 1920–21.

Project.	Name of plant.	Type of pumping unit.[1]	Plant capacity.	Number of units.	Net lift.	First cost of plant.	Cost of operation.	Estimated depreciation.	Energy used for pumping.	Acre-feet pumped.	Cost per acre-foot without depreciation.	Cost per foot acre-foot without depreciation.	Remarks.
			Horsepower.		*Feet.*				*Kilowatt-hours.*				
Salt River	Highline Lift	H. M. D. C.	650	4	47.0	$91,038.90	$23,450.44	$4,551.94	3,642,599	51,755	$0.54	$0.0115	
	Clemans	do	100	1	31.3	8,124.41	1,327.37	812.44	209,760	2,824	.76	.0243	
	San Francisco	do	100	1	30.0	29,978.98	531.92	2,997.90	26,726	368	9.59	.3197	Out of service most of year.
	McQueens	V. M. D. C.	75	1	50.0	17,254.44	2,031.57	1,207.81	232,085	2,608	1.24	.0248	
	Battery 1 (A)	do	75	1	49.0	16,675.29	1,437.59	1,312.50	248,978	2,341	1.17	.0239	
	Battery 2 (B)	do	75	1	46.0	20,922.87	1,342.63	1,312.50	227,509	2,831	.94	.0204	
	Battery 3 (C)	do	75	1	48.4	16,992.34	1,438.01	1,312.50	266,630	3,226	.85	.0176	
	Battery 4 (D)	do	75	1	46.5	19,645.62	932.66	1,312.50	138,101	1,878	1.19	.0256	
	Battery 5 (E)	do	75	1	44.5	22,185.79	1,364.35	1,312.50	165,549	2,095	1.28	.0288	
	Battery 6 (F)	do	75	1	32.0	17,067.99	1,077.55	1,312.50	153,524	2,426	.99	.0309	
	34 North Side drainage wells.	do	[2] 35	1	24.45	332,589.36	15,230.65	23,281.26	1,838,624	21,176	1.82	.0744	
	19 South Side drainage wells.	do	[2] 35	1	19.17	185,858.76	6,987.53	13,010.11	911,566	17,676	1.13	.0590	
Yuma	Reservation pumping station.	G. E. D. C.	110	2	5.6	6,775.60	2,785.42			1,650	1.69	.3018	
	West Yuma pumping	do	40	1	7	900.00	652.18			142	4.56	.6516	
	Valley drainage	G. E. D. S.	175	2	av. 9	130,751.12	11,142.03			25,466	.449	.0499	
Grand Valley	Price-Stub	V. T. D. C.	125	1	31.0	46,697.83	984.69	1,000.00		7,143	*a*.14	*a*.0045	*a* Depreciation not included.
Minidoka	Pumping station No. 1.	V. M. D. C.	2,760	5	28.66	182,920.77	*a*24,693.32	*a*19,356.00	7,686,571	174,002			*a* O. and M. costs as well as depreciation carried for 3 South Side stations as a unit.
	Pumping station No. 2.	do	2,400	4	29.76	181,845.30			*a*12,210,982	140,453	*b*.063	.00263	*a* Includes all energy used at stations 2 and 3.
	Pumping station No. 3	do	1,560	3	29.38	101,395.64				80,602			*b* Average.
	West End [3]	H. M. D. C.	150	2	21.25	18,745.61		817.30	308,040	6,346			O. and M. costs and depreciation carried for 7 North Side stations as a unit, and no individual data are available.
	1812 pumping station [3]	do	5	1	4.0	1,008.76		65.57	5,783	494			
	A-4 Raise [3]	Scoop wheel.	25	1	3.5	3,328.42		249.63	32,370	2,574			
	1817 pumping station [3]	do	10	1	4.8	3,634.71		272.62	9,280	1,007			
	114 pumping station [3]	H. M. D. C.	7.5	1	7.0	2,803.97		102.26	9,364	408			
	Boersch Lake	V. M. D. C.	200	2	19.8	32,947.72		1,647.39	433,720	14,137			
	C-2 pumping station [3]	Scoop wheel.	10	1	2.5	5,008.15		375.61	8,295	*a*1,500			*a* Estimated.
Huntley	Ballantine	V. T. D. C.	584	2	44.6	73,833.32	4,882.63	2,215.00		9,293	.635	.0142	
	Ballantine auxiliary	G. E. D. C.	368	2	44.6	70,531.59	3,096.48	3,510.00		1,688	1.84	.0143	

North Platte...	Dutch Flat Drain:												
	No. 1	V. M. D. C..	30	1	8-40					91.3			Experimental runs; no definite data available.
	No. 2	do	20	1	45								Not completed.
	No. 3	do	20	1	45								Do.
North Dakota pumping.	Pumping station No. 1.	S. T. D. C...	490	3	56.0	8,821.00	9,697.42	300.00	161,286	1,852	5.23	.0934	
	Pumping station No. 2.	H. M. D. C..	175	2	26.6	14,065.00	5,153.51	800.00	58,317	1,294	3.98	.1496	
	Pumping station No. 3.	do	405	3	32.0	39,647.00	19,732.63	1,800.00	291,212	3,796	5.19	.1622	
	Pumping station No. 4.	do	100	1	27.25	8,821.00	2,969.28	500.00	30,016	698	4.25	.1560	
Okanogan.....	Robinson Flat	do	200	2	188.0	30,077.24	15,866.18		426,340	1,008	14.75	.0785	Operated by power supplied by Okanogan Valley Power Co.
	Salmon Lake	G. E. D. C..	300	3	av. 30	21,733.21	19,401.61			2,358	8.22	.274	Not operated since October, 1920.
	Duck Lake	do	150	1	55.0	10,858.21	2,450.50			138	17.75	.323	Only operated part of 1 month during fiscal year.
	3 well pumps [4]	do	[2] 15	3	45.0	14,872.20	6,248.22			251	24.89	.553	Not operated since October, 1920.
	2 Riverside pumps	do	[2] 15	2	35 & 82	6,985.83	1,854.89			107	17.33		Not operated since September, 1920.
	Spring Coulee well [4]	do	15	1	40.0	1,489.02	2,034.83			149	13.66	.342	Do.
	Diversion weir pump	do	15	1									No data reported.
Yakima - Sunnyside.	Grand View [5]	V. T. D. C..	214	1	78.0	72,500.00	3,367.00	3,120.00	657,400	11,817	.80		Cost per acre-foot includes cost of electric power from Rocky Ford plant, $3,000.58.
		H. M. D. C..	175	2	78 & 35								
	Snipes Mountain	V. T. D. C..	550	2	200.0	48,500.00	3,525.00	1,890.00		5,827	.93	.00465	Cost of new unit not included.
	Little Snipes Mountain	H. T. D. C..	5	1	50.0	1,162.00	108.00	45.00					No record kept of water pumped.
	Hillcrest	V. T. D. C..	33	1	103.0	5,800.00	309.00	300.00		410	1.48	.01435	
	Outlook	do	800	2	110.0	92,000.00	4,061.12	2,480.00		15,685	.42	.00382	
	Prosser	H. T. D. C..	190	1	105.0	31,968.00	1,598.20	1,500.00		2,740	1.13	.01076	
	Spring Creek	do	160	1	90.0	28,050.00	1,576.21	1,500.00		3,200	.96	.01067	

[1] Type V. M. D. C.=Vertical motor-driven centrifugal pump. Type H. M. D. C.=Horizontal motor-driven centrifugal pump. Type S. T. D. C.=Steam turbine-driven centrifugal pump. Type V. T. D. C.=Vertical hydraulic turbine-driven centrifugal pump. Type H. T. D. C.=Horizontal hydraulic turbine-driven centrifugal pump. Type G. E. D. C.=Gas-engine-driven centrifugal pump. Type G. E. D. S.=Gas-engine-driven screw pump.

[2] Each.

[3] Operated by irrigation district.

[4] Constructed during the year 1919-20.

[5] Total capacity 389 V. T. D. C., 214 horsepower, 78-foot head; H. M. D. C., 125 horsepower, 78-foot head; H. M. D. C., 50 horsepower, 35-foot head.

Power plants operated by the United States Reclamation Service during the fiscal year 1920–21.

Project.	Name of plant.	Station capacity.	Number of units.	Head.	First cost of plant.	Cost of operation.	Estimated depreciation.	Cost per kilowatt-hour, exclusive of depreciation.	Output.	Distribution of power generated (kilowatt hours). Sold to consumers.	Used for irrigation pumping.	Used for other purposes.	Losses.	Gross power sales.
		Kv-a.		*Feet.*					*Kilowatt hours.*					
Salt River [1]	Roosevelt	11,750	6	80–225	$825,615.01	$80,485.18	$41,280.75	$0.001645	48,863,214					
	Crosscut	5,250	6	111	723,243.86	24,919.54	36,162.19	.002621	9,501,900					
	South Consolidated	2,000	2	23	162,123.05	9,693.07	8,106.15	.002620	3,699,300	[2] 54,035,798	8,088,275	230,110	7,241,361	$520,032.32
	Arizona Falls	1,060	2	19	109,636.68	6,999.09	5,481.83	.004001	1,748,690					
	Chandler	600	1	40	91,924.84	6,790.72	4,596.24	.002788	2,437,270					
Boise	Boise [3]	1,875	3	30	167,905.37	2,257.14	3,358.10	[4] .001544	7,312,590	1,461,930		493,507		13,242.36
Minidoka	Minidoka	7,000	5	48.73	455,317.40	24,850.43	15,012.00	.000502	49,455,540	22,784,026	19,897,553	738,990	6,034,971	129,528.95
North Platte	Lingle	750	2	105	97,314.00	24,397.34	7,442.00	.01045	2,428,695	783,800		1,052,270	[5] 592,625	22,902.55
Newlands	Lahonton [6]	1,875	3	110	138,512.00		1,385.12		4,771,670	4,742,467		29,203		16,877.30
North Dakota pumping.	Williston	1,150	4		176,803.30	72,274.91	3,000.00	.03422	2,113,666	1,140,493	540,831	344,205	88,137	[7] 72,594.00
Rio Grande	Elephant Butte No. 2	187	1	[8] 155.35	8,440.00	4,549.89		.03199	142,089		12,779	129,310		
Strawberry Valley	Spanish Fork	1,000	2	125	60,724.80	19,777.55	3,033.72	.01559	1,268,499	1,070,005		138,930	59,564	20,756.91
Okanogan	Power Plant No. 1 [9]	187	1	108	11,923.44									
	Power Plant No. 2 [9]	187	1	55	13,931.42									
	Emergency Power Plant No. 3 [10]	187	1		24,279.27	8,338.29		.04057	205,470		205,470			
Yakima:														
Storage	Tieton No. 1 [11]	270	2	45	40,000.00	2,318.66	2,719.96	.01192	194,340			194,340		
	Tieton No. 2 [12]	1,000	2	74										
Sunnyside	Rocky Ford [13]	187	1	73	23,000.00	3,000.58	1,056.00	.004568	657,400		657,400			

[1] System taken over by water users Nov. 1, 1917.
[2] As all plants feed into common transmission line, segregation is impossible.
[3] Idaho Power Co. contract terminated Apr. 30, 1921. Now operated by U. S. Reclamation Service, with an exchange schedule arranged with the Idaho Power Co., wherein the Boise project and the Minidoka project receive power from the company's lines in exchange for power generated at the plant.
[4] Cost based on 2 months' operation by U. S. Reclamation Service.
[5] Includes losses in water rheostat.
[6] Power plant and transmission line leased to the Canon Power Co. for 10 years beginning Dec. 1, 1914.
[7] Does not include proportion of water payments for energy used in pumping in June.
[8] Average.
[9] Not operated.
[10] Dismantled in spring of 1921; not operated since Oct. 20, 1920.
[11] Plant operated Apr. 4 to June 30 only, during fiscal year.
[12] Construction plant 70 per cent complete.
[13] Operated by irrigation district.

Contracts for the sale of power in force June 30, 1921.

Project.	Name of contractor.	Date of contract.	Date of expiration.	Maximum load (kilowatts).	Rate per kilowatt-hour.	Gross income, fiscal year 1920-21.	Remarks.
Boise	Electric Inv. Co. (Idaho Power Co.).	May 16, 1916	May 16, 1921	None	$0.0035	$11,037.00	New contract Apr. 2, 1921.
Minidoka	City of Burley	Jan. 15, 1920	Jan. 1, 1930	200–3,000	Standard [1]	49,368.29	Heat, $1.25 per kilowatt-month, minimum charge, $6.25 season.
	Paul Electric Co	Jan. 20, 1914	Feb. 13, 1924	100–500	do	6,913.95	Heat, 75 cents per kilowatt-month for first 50 kilowatts; heat, $1.25 per kilowatt-month for over 50 kilowatts; minimum charge, $6.25 for season.
	City of Rupert	Jan. 15, 1920	Jan. 1, 1930	150–2,000	do	24,372.77	Heat, same as for Burley.
	Village of Albion	Oct. 15, 1915	Jan. 8, 1926	100	do	4,996.93	Light and power only.
	Meleher Mining & Milling Co.[2]	July 27, 1917	July 27, 1922	120–200	do	3,369.60	See footnote.[2]
	Minidoka Irrigation District	Dec. 2, 1916			$0.003	2,395.68	Energy furnished at approximate cost of production and distribution.
	Village of Albion	Sept. 18, 1916	Jan. 8, 1926	200	$1.25 per month	1,930.00	Heating only; four months' guaranteed use.
	Idaho Power Co.[3]	Apr. 1, 1921	Mar. 30, 1923	937 kilovolt-amperes (½ capacity of plant).	None	2,205.36	See power contracts in force June 30, 1921.
	Unity Light & Power Co	Mar. 19, 1917	Mar. 19, 1927	30–41	Standard	2,344.24	
	Burley Milling & Elevator Co.	Oct. 2, 1915	Nov. 5, 1920	10	do	703.78	Contract completed Nov. 5, 1920.

[1] *Minidoka standard rates for electric light and power:*

For 50 hours' use of maximum demand ..... per month per kilowatt .. $2.00
Next 50 hours' use of maximum demand ..... per kilowatt-hour .. .03
Do ..... do .... .02
Next 150 hours' use of maximum demand ..... per kilowatt-hour .. $0.01
Balance hours' use of maximum demand ..... do .... .00[5]

(Above rates increased 25 per cent during June, July, and August.)

Above rates subject to discount for maximum demand of—	Per cent.
2 kilowatts and less than 4 kilowatts	2
4 kilowatts and less than 7 kilowatts	4
7 kilowatts and less than 11 kilowatts	6
11 kilowatts and less than 15 kilowatts	8
15 kilowatts and less than 19 kilowatts	10
19 kilowatts and less than 24 kilowatts	12
24 kilowatts and less than 29 kilowatts	14
29 kilowatts and less than 35 kilowatts	16

Above rates subject to discount for maximum demand of—Continued.	Per cent.
35 kilowatts and less than 41 kilowatts	18
41 kilowatts and less than 48 kilowatts	20
48 kilowatts and less than 57 kilowatts	22
57 kilowatts and less than 67 kilowatts	24
67 kilowatts and less than 80 kilowatts	26
80 kilowatts and less than 100 kilowatts	28
100 kilowatts and over	30

Minimum payment shall not be less than $1.80 per month per kilowatt of the contractor's agreed maximum demand. All rates subject to 10 per cent discount if energy is delivered and metered at approximately 2,200 volts or more, or 8 per cent if delivered at 2,200 or more volts and metered at a lower voltage.

[2] Service discontinued in June, 1919, because of delinquent payments. No payments made on account during past fiscal year.

[3] New contract was approved Apr. 2, 1921, providing for the operation of the plant by the U. S. Reclamation Service, with an exchange schedule arranged with the Idaho Power Co., wherein the Boise project and the Minidoka project receive power from the company's lines in exchange for power generated at the plant.

Contracts for the sale of power in force June 30, 1921—Continued.

Project.	Name of contractor.	Date of contract.	Date of expiration.	Maximum load (kilowatts).	Rate per kilowatt-hour.	Gross income, fiscal year 1920-21.	Remarks.
Minidoka	Amalgamated Sugar Co	Oct. 16, 1912	Dec. 21, 1922	100	Standard	$2,694.16	Heat, 75 cents per kilowatt-month.
	Ferry Light & Power Co	Mar. 12, 1919	Mar. 12, 1929	15	do	1,152.03	
	East End Electric Co	Jan. 23, 1918	Jan. 23, 1928	15	do	1,179.87	
	Rural Electric Co	Mar. 19, 1917	Mar. 31, 1927	11-15	do	1,210.61	
	Riverside Electric Co	Feb. 15, 1918	Feb. 15, 1928	15	do	776.99	
	Village of Heyburn	Mar. 9, 1920	Jan. 1, 1930	50-200	do	2,025.22	Heat, same as Burley.
	Minidoka North Side Power Co	Apr. 1, 1913	Sept. 2, 1923	11-15	do	679.63	Heat, 75 cents for kilowatt-month up to 12 kilowatts; $1.25 for excess.
	Declo Light & Power Co	May 4, 1918	May 4, 1928	10	do	977.96	
	Central Electric Co	Mar. 12, 1918	Mar. 12, 1928	10	do	496.70	
	Shodde Electric Co	May 24, 1915	June 28, 1925	5-7	do	414.20	
	Rural Electric Co	Nov. 1, 1919	Mar. 31, 1927	20-70	$1.25 kilowatt-month	406.39	Minimum, $6.25 per season.
	Acequia Dairy & Produce Co	Mar. 1, 1916	May 19, 1926	Power ½, heat 3	Standard	336.73	Canceled Feb. 1, 1921.
	Minidoka Irrigation District	Jan. 27, 1917	Apr. 4, 1927	Power 1, heat 23.	do	277.62	Heat rate, $1.25 per kilowatt-month.
	West Budge Power Co	Feb. 1, 1919	Feb. 1, 1929	5	do	232.51	
	Farmers Electric Co	June 1, 1914	June 29, 1924	2	do	130.65	
	Walcott Electric Co	Feb. 17, 1919	Feb. 17, 1929	2	do	225.14	
	R. F. Ray	Apr. 1, 1918	Apr. 1, 1928	3 heat	do	21.00	3 kilowatts heat at 75 cents per kilowatt-month; over 3 kilowatts, $1.25 per kilowatt-month.
	Fruitland Drive Power Co	Oct. 22, 1917	Oct. 22, 1927	2	do	95.61	
	Empire Electric Co	June 1, 1919	June 1, 1929	2	do	96.26	
	West End Power Co	June 18, 1917	June 18, 1927	2-3	do	118.45	
	Theodore Jorgensen	Sept. 1, 1919	Sept. 1, 1920	5	do	32.61	Completed contract Sept. 1, 1920.
	George W. Curtis	Oct. 18, 1917	Oct. 18, 1927	Power 1, heat 5	do	45.21	Heat rate, 75 cents per kilowatt-month.
	Top Notch Electric Co	Nov. 1, 1919	Nov. 1, 1922	3	do	221.53	
	North Heyburn Electric Co	Jan. 12, 1918	Jan. 12, 1928	2	do	87.62	
	Lancy J. Camp	Nov. 2, 1917	Nov. 2, 1927	Power 1, heat 5	do	61.35	Do.
	Mathews Bros	Apr. 1, 1919	Apr. 1, 1929	2	do	53.81	
	E. C. Holley	May 25, 1915	Sept. 3, 1925	Power ½, heat 4	do	48.88	Do.
	W. A. Drew	Oct. 21, 1914	Jan. 2, 1925	½-1	do	49.57	
	James A. Handy	Dec. 1, 1919	Dec. 1, 1920	Power 2, heat 4	do	4.51	Canceled Aug. 1, 1920; heat, $1.25 per kilowatt-month; minimum charge, $6.25 per season.
	Mathias Christein	Oct. 21, 1914	Jan. 2, 1925	1	do	47.71	
	Thos. B. Anderson	do	do	1-2	do	39.39	
	Geo. B. Flynn	July 3, 1918	July 3, 1928	1	do	31.29	

	James A. Handy	Oct. 13, 1917	Oct. 13, 1927	Power ½, heat 4	do	56.63	Heat, 75 cents per kilowatt-month.
	Isaac E. Holmes	June 6, 1917	June 6, 1927	Power ½-1, heat 4.	do	39.40	Do.
	J. E. Wilferth	Nov. 1, 1919	Nov. 1, 1922	2	do	46.02	
	A. F. Ames	Oct. 21, 1914	Jan. 2, 1925	1	do	23.46	
	D. A. Penrod	Apr. 9, 1918	Apr. 9, 1928	1	do	25.80	
	C. W. Foster	Jan. 1, 1918	Jan. 1, 1928	½-1	do	21.77	
	C. A. Brewerton	June 1, 1919	June 1, 1929	1	do	25.50	
	Emerson School District No. 11	May 1, 1919	May 1, 1929	½-1	do	20.50	
	Ernest J. Hanson	Oct. 1, 1914	Jan. 13, 1925	½	do	22.60	
	Charles Swenson	June 6, 1917	June 6, 1927	½-1	do	21.67	
	Herbert Barker	July 1, 1919	July 1, 1929	1	do	23.46	
	Irl G. Clayville	Oct. 21, 1914	Jan. 2, 1925	½-1	do	20.42	
	H. Lundgren	Oct. 22, 1918	Oct. 22, 1928	½-1	do	7.82	Canceled Dec. 1, 1920.
	Allen M. Smith	Dec. 23, 1919	Dec. 23, 1922	2	do	51.86	
	U. S. Shiba	Dec. 22, 1919	Jan. 1, 1923	2	do	19.92	Do.
	W. F. McCord	Jan. 1, 1920	Mar. 1, 1921	2	do	27.07	Canceled Feb. 1, 1920.
	J. E. Cloughley	do	Jan. 1, 1923	2	do	46.02	
	J. W. Elquist	do	do	2	do	46.02	
	E. B. Sehrock	Dec. 1, 1917	Dec. 1, 1927	½-1	do	24.09	
	Frederick Larsen	Nov. 26, 1917	Nov. 26, 1927	½-1	do	22.58	
	S. C. Sorenson	Mar. 14, 1918	Mar. 14, 1928	½-1	do	19.09	
	Louis L. Yates	Dec. 26, 1917	Dec. 26, 1927	½-1	do	21.17	
	Lee St. Clair	Sept. 18, 1915	Sept. 27, 1925	½	do	20.24	
	W. A. Nelson	June 15, 1917	June 15, 1927	½-1	do	20.84	
	Harvey Moncur	Sept. 16, 1914	Oct. 9, 1924	½-1	do	20.61	
	C. F. Yahn	Dec. 21, 1917	Dec. 21, 1927	½-1	do	20.73	
	E. T. Hollenbeck	Oct. 21, 1914	Jan. 2, 1925	½-1	do	20.19	
	Arthur Brothers	Nov. 1, 1917	Nov. 1, 1927	½-1	do	20.01	
	J. T. Gaskill	Oct. 1, 1919	Oct. 1, 1922	1	do	24.12	
	L. E. Bowman	Nov. 1, 1919	Nov. 1, 1922	1	do	23.46	
	W. A. Gill	Oct. 18, 1915	Jan. 11, 1926	½-1	do	12.04	
	G. M. Dewey	Sept. 1, 1920	Sept. 1, 1921	5	do	128.18	
	Village of Deelo	Oct. 26, 1920	Nov. 1, 1930	30-41	do	1,123.76	
	P. J. Mae Kenzie	Dec. 1, 1920	Dec. 1, 1923	1	do	13.34	
	Acequia Electric Co	do	Dec. 1, 1930	7-15	do	190.32	
	Portland Feeder Co	Jan. 1, 1921	Feb. 1, 1921	41	$2 per kilowatt-month.	386.16	Energy used till Mar. 31, 1921.
North Platte	Village of Lingle	Oct. 27, 1919	Oct. 27, 1921	20	Standard [4]	925.14	

[4] *North Platte standard rates for electric lights and power:*

For first 20 hours' use of maximum demand, 8 cents per kilowatt-hour.
For next 20 hours' use of maximum demand, 6 cents per kilowatt-hour.
For next 40 hours' use of maximum demand, 4 cents per kilowatt-hour.
For next 40 hours' use of maximum demand, 3 cents per kilowatt-hour.
For next 120 hours' use of maximum demand, 2 cents per kilowatt-hour.
For balance hours' use of maximum demand, 1 cent per kilowatt-hour.

The above rates subject to discount for maximum demand of—

	Per cent.
15 kilowatts and less than 20 kilowatts	1
20 kilowatts and less than 30 kilowatts	2
30 kilowatts and less than 40 kilowatts	3
40 kilowatts and less than 50 kilowatts	4
50 kilowatts and less than 60 kilowatts	5

The above rates subject to discount for maximum demand of—Continued.

	Per cent.
60 kilowatts and less than 70 kilowatts	6
70 kilowatts and less than 80 kilowatts	7
80 kilowatts and less than 90 kilowatts	8
90 kilowatts and less than 100 kilowatts	9
100 kilowatts and over	10

Minimum payment shall be not less than $1.50 per kilowatt of the contractor's agreed maximum demand. All rates subject to 10 per cent discount if energy is delivered and metered at approximately 30,000 volts, or more, or 8 per cent discount if delivered at 30,000 or more volts and metered at a lower voltage.

Contracts for the sale of power in force June 30, 1921—Continued.

Project.	Name of contractor.	Date of contract.	Date of expiration.	Maximum load (kilowatts).	Rate per kilowatt-hour.	Gross income, fiscal year 1920–21.	Remarks.
North Platte	City of Torrington	May 10, 1921	May 10, 1923	125	Standard	$9,103.45	
	Village of Morrill	Apr. 27, 1920	Apr. 27, 1922	75	do	4,035.88	
	City of Mitchell	do	do	150	do	8,838.08	
Newlands	Canon Power Co	July 10, 1914	Nov. 30, 1924	1,500	¼ cent to ⅜ cent	16,655.45	Minimum charge, $1,200 April to September, inclusive.
North Dakota pumping	City of Williston, N. Dak	Dec. 20, 1912	Dec. 20, 1922	600	2½ to 5½	47,914.73	Revised rates (as given) were effective Jan. 1, 1919.
Strawberry Valley	Spanish Fork City	Feb. 5, 1919	Feb. 5, 1922	150	Standard [5]	9,684.37	See footnote [5].
	Payson City	do	do	120	do	7,748.49	Do.
	Springville City	July 26, 1920	July 26, 1923	125	1 cent to 2 cents	1,416.72	Minimum charge, $50 per month. See contracts in force June 30, 1921.
	Mapleton Light & Power Co	May 31, 1919	May 31, 1924	5	Standard [5]	112.98	See footnote [5].
	Town of Salem	Feb. 5, 1919	Feb. 5, 1922	40	do	1,489.57	Do.
	Springville Canning Co	June 19, 1919	Dec. 31, 1920	5	do	45.75	Contract term, Dec. 31, 1920, by request of contractor.
	Castilla Hot Springs Co	Sept. 6, 1919	Sept. 6, 1924	10	do	193.37	
	Joseph Lucas	Feb. 21, 1919	Feb. 21, 1922	5	9 cents	36.16	
	Keeler Electric Co	Apr. 9, 1921	Apr. 9, 1926	5	Standard [5]	29.50	

[5] *Strawberry Valley standard rates for electric light and power:*

Schedule of rates.—The kilowatt-hours of energy received by the contractor during any calendar month shall be paid for on the basis of the maximum demand during that month and as follows:

For the first quantity of energy actually used which, stated in kilowatt-hours, is equal to or less than the product of the maximum demand in kilowatts multiplied by 25 (hours), 6 cents per kilowatt-hour.

For the next quantity of energy actually used which, stated in kilowatt-hours, is equal to or less than the product of the maximum demand in kilowatts multiplied by 25 (hours), 4 cents per kilowatt-hour.

For the next quantity of energy actually used which, stated in kilowatt-hours, is equal to or less than the product of the maximum demand in kilowatts multiplied by 50 (hours), 3 cents per kilowatt-hour.

For the next quantity of energy actually used which, stated in kilowatt-hours, is equal to or less than the product of the maximum demand in kilowatts multiplied by 50 (hours), 2 cents per kilowatt-hour.

For the next quantity of energy actually used which, stated in kilowatt-hours, is equal to or less than the product of the maximum demand in kilowatts multiplied by 150 (hours), 1 cent per kilowatt-hour.

For the balance of the energy actually used ¾ cent per kilowatt-hour.

Demand discounts.—The rate stated in the above schedule will be subject to a discount based on the contractor's maximum demand, as shown in the following table:

TABLE OF DISCOUNTS.

For a maximum demand of—	Per cent.
15 kilowatts and less than 20 kilowatts	1
20 kilowatts and less than 30 kilowatts	2
30 kilowatts and less than 40 kilowatts	3
40 kilowatts and less than 50 kilowatts	4
50 kilowatts and less than 60 kilowatts	5
60 kilowatts and less than 70 kilowatts	6
70 kilowatts and less than 80 kilowatts	7
80 kilowatts and less than 90 kilowatts	8
90 kilowatts and less than 100 kilowatts	9
100 kilowatts and over	10

Voltage discount.—The monthly bill, after applying discounts stated in article 6, will be subject to a further discount of 10 per cent if the energy is delivered and metered at approximately 10,000 or more volts, or 8 per cent if delivered at approximately 10,000 or more volts and metered at a lower voltage.

UNDEVELOPED POWER.

In the following table are listed power sites that have been noted on or adjacent to reclamation projects built or investigated by the Reclamation Service. The data given are necessarily, in most cases, only roughly approximate:

Undeveloped water power.

Project.	Name of site.	Head.	Horsepower.
Arizona-California:		*Feet.*	
Yuma	Drop in California Canal	10	1,200
Do	Araz	22	9,000
Do	Laguna Dam (doubtful)	9–18	4,000
California:			
Iron Canyon	Iron Canyon	60–130	35,000
Orland	Drop, high line to South Canal	27	678
Pit River	Hat Creek	200	9,000–12,000
Do	Fall River	70–400	7,000–40,000
Do	Big Bend	800–900	150,000
Colorado:			
Grand Valley [1]	Main Canal	31–48	3,000
Uncompahgre [1]	Various sites	18–160	40,000
Idaho:			
Boise	Arrowrock Dam	60–230	10,000–20,000
Do.[1]	Various sites	20–90	1,900
Minidoka	Minidoka Dam	46	10,000
Do	Head of Walcott Lake	46	30,000
Montana:			
Flathead (Indian)	No. 1 Newell Tunnel	169	130,000
Do	No. 2 Buffalo Dam	48	38,000
Do	No. 3	24	19,000
Do	No. 4	88	70,000
Do	No. 5	19	15,000
Huntley	Second drop, main canal	41	275
Montana-North Dakota: Lower Yellowstone.[1]	Lateral K. K. drop	34	314
Nebraska: North Platte [1]	Pathfinder Dam	60–200	17,000–60,000
Nevada:			
Newlands	Lahontan	120	5,000
Do	26-foot drop	26	2,900
New Mexico-Texas: Rio Grande.	Elephant Butte Dam	65–185	12,000
Oregon:			
Columbia River	Celilo Falls	45–105	500,000–800,000
Deschutes	4 sites	65–110	90,000–100,000
Silver Lake	Silver Creek	48–120	2,900
Umatilla	Drainage outfall	28	145
Warner Valley	Deep Creek	.....	2,000
Willamette Valley	Santiam River and Marion Lake	.....	14,000
Do	McKenzie River, 2 plants	415–550	30,500
Do	Middle Fork, Willamette and Waldo Lake Storage.	[2] 4,400	65,000
Oregon-California: Klamath	Various sites	21–88	10,000
Utah: Strawberry Valley	Spanish Fork	126	1,500
Washington:			
Columbia River	Priest Rapids	60	200,000
Okanogan	Salmon Creek No. 1	347	2,000
Do	Salmon Creek No. 3	441	2,550
Yakima-Sunnyside	Mabton	44	131
Do	Main Canal	54	276
Yakima-Tieton	Lateral E	100	3,410
Yakima-Wapato	Drop 0	24	2,930
Do	Drop 1	40	4,083
Do	Drop 2	32	2,443
Do	Drop 3	34	1,488
Wyoming: Shoshone	Shoshone	200	40,000
Total		.....	1,506,300–1,954,300

[1] Power from irrigation flow only.

[2] Several stages.

PURCHASE OF MATERIAL AND SUPPLIES.

Important purchases for the Service are made by the Denver office where a purchasing department is maintained. The project offices purchase direct perishable supplies, forage, and such other com-

modities as may be bought locally to best advantage. By purchasing through the Denver office all projects derive the benefits inherent in large-scale buying, and, in the purchase of construction materials and equipment, the purchasing department of that office has the advantage of advising with the several engineers and technical departments.

During the past year market conditions and intermittent operation of a great many of the plants made deliveries almost as uncertain as during war times, although for the first time in several years the car situation was comparatively easy.

The total number of purchases made during the fiscal year 1921 was 6,599; the total value of all purchases amounted to $2, 314,782.36, with a cash discount of $18,383.04, leaving a net amount of $2,296,-399.32, expended through this department. There were issued 4,579 Government bills of lading for the movement of freight, and 4,620 transportation requests were issued for the travel of employees in the Service.

The following table shows a summary of data covering purchases made during the past 12 years:

Fiscal year.	Number of purchases.	Gross amount.	Discount.
1910	1,774	$504,023.60	.....
1911	1,607	574,323.74	.....
1912	2,205	930,018.53	.....
1913	2,735	459,890.17	$4,286.29
1914	3,116	471,446.28	4,604.28
1915	2,854	454,661.46	3,842.09
1916	5,049	680,601.99	6,747.38
1917	4,989	1,095,830.36	13,000.25
1918	6,215	1,809,580.84	17,876.29
1919	5,038	1,489,583.04	8,727.12
1920	3,968	948,270.46	9,523.42
1921	6,599	2,314,782.36	18,383.04
Total	46,149	11,733,012.83	86,990.16

FREIGHT, PASSENGER, AND EXPRESS TRANSPORTATION.

On July 1, 1920, the unsettled claims for transportation of freight and express amounted to $42,094.96. During the fiscal year new claims were filed for like service to the amount of $374,223.31, making a total of $416,318.27. Claims filed for $359,499.56 were given administrative examination, the amount due found to be $343,087.96, and settlement effected with claimants on that basis, leaving $56,-818.71 outstanding June 30, 1921, of which $32,075.74 is with the carriers for correction.

At commercial rates the charges on freight and express shipments settled during the year would have amounted to $599,730.66.

Passenger transportation claims to the amount of $65,184.53 were examined and passed for payment.

Refund claims amounting to $1,189.05 were filed with carriers on commercial shipments for contractors on United States reclamation work, the amounts paid being covered into the reclamation fund.

The following table gives general data on freight and express transportation since 1906:

Fiscal year.	Bills settled.	Commercial charges.	Deducted account of contracts, land grant, and other causes.	
			Total.	Per cent.
1907	$278,782.10	$470,863.26	$192,081.16	40.8
1908	369,583.04	577,830.42	208,247.38	36.0
1909	778,047.12	1,403,970.10	625,922.98	44.5
1910	437,032.61	758,808.76	321,776.15	42.4
1911	405,360.55	666,876.59	261,516.04	39.2
1912	610,740.23	1,055,733.27	444,993.04	42.1
1913	481,118.91	837,077.59	355,958.68	42.5
1914	547,705.99	927,163.49	379,457.50	40.9
1915	778,893.33	1,393,347.96	614,454.63	44.1
1916	471,606.52	817,481.33	345,874.81	42.3
1917	393,477.70	653,013.98	259,536.28	39.7
1918	324,562.28	608,479.63	283,917.35	46.6
1919	331,056.20	534,580.94	203,524.74	38.1
1920	267,303.53	452,101.12	184,797.59	41.9
1921	359,499.56	599,730.66	240,231.10	40.0
Total	6,834,769.67	11,757,059.10	4,922,289.43	41.9

CEMENT-TESTING WORK.

On July 1, 1917, the cement-testing work for the Reclamation Service was turned over to the Bureau of Standards of the Department of Commerce. See Nineteenth Annual Report, pages 46 and 528, for results of inspection and tests to 1919.

ORGANIZATION AND PERSONNEL.

The Federal reclamation law places in the Secretary of the Interior the authority and responsibility for the reclamation work. As the instrument for the execution of such work the Secretary has organized the Reclamation Service, headed by the director, who, with the assistant director, has headquarters at Washington and who frequently travels to the projects and proposed works in the field. A subordinate headquarters office is maintained at Denver in charge of the chief engineer, who, with two assistant chief engineers, has more immediate contact with all the field work. In the Washington office are conducted those operations that are necessary in dealing with the Secretary, Congress, the Treasury Department, and other Federal agencies, as well as those involving general direction and administration of the work.

At Denver there is a force of technical men for the design of the principal engineering structures, including work of an electrical nature. That is the headquarters point for extensive purchases, and the chief engineer and two assistants alternate in charge of the office and traveling from one project to another to maintain close administration and give prompt advice and decision on engineering and other details.

Each project is in administrative charge of a project manager. The project force includes the necessary engineers, clerical help, and operatives such as gate tenders, ditch riders, and water masters for the work of constructing, operating, and maintaining the irrigation systems, with sufficient common and skilled labor for the work in hand.

The legal work of the Reclamation Service both in the Washington office and in the field is in charge of the chief counsel. There are eight main field offices of the legal division, located, respectively, at Denver, Colo.; Montrose, Colo.; Mitchell, Nebr.; Helena, Mont.; Boise, Idaho; Portland, Oreg.; San Francisco, Calif.; and El Paso, Tex., and one legal suboffice located at American Falls, Idaho. The attorneys in charge of these offices are known as district counsel and are the legal advisers to the various project managers located within their respective districts. In the central Denver office is located a district counsel who is legal adviser to the chief engineer. Several million dollars are at present involved in litigation directly connected with the Reclamation Service. The immediate supervision of litigated cases is in the Department of Justice, but the legal division of the Service takes an active part in preparing and trying all such suits.

On June 30, 1921, the force of the Reclamation Service comprised 4,507 persons, subdivided as follows: Educational, 581; noneducational, 1,289; laborers, 2,637. In addition, the employees of contractors working on reclamation projects numbered 147. A more detailed statement, giving the administrative personnel of the Service and the number of employees by projects, classified as above, will be found in the appendix.

Wages of labor.—A table in the appendix shows, by projects, the average daily wages paid for common labor in June and December, 1920, and for June, 1921; also the increase for the past seven years, which amounts to $1.20 per day. As shown by this table, wages have increased from an average of $2.23 in June, 1914, to $3.43 in June, 1921.

Typhoid prophylactic.—Although no epidemics of typhoid fever were reported from any of the projects, sporadic cases occurred at a number of places. Spread of the disease was promptly checked by various measures, including the use of typhoid prophylactic, supplies of which were secured, as heretofore, from the War Department. During the fiscal year approximately 150 treatments were sent to the field, making about 4,150 since July, 1912, when this work of prophylaxis was begun in cooperation with the War Department.

FINANCES.

The following statement shows the sources of all funds placed at the disposal of the Service, giving the receipts for the fiscal year and to date.

Sources.	Receipts for fiscal year 1921.	Receipts to date.
Reclamation fund:		
Sale of public land accruing to June 30, 1921	$2,750,013.85	$103,050,209.64
Sale of town lots	56,388.93	549,718.56
Advances from General Treasury (bond loan)	.....	20,000,000.00
Oil-leasing royalties	4,617,665.13	4,617,665.13
Potassium royalties	12,724.47	12,724.47
Total	7,436,792.38	128,230,317.80
Collections	4,191,884.13	37,055,942.14
Grand total reclamation fund	11,628,676.51	165,286,259.94
Less repayment to General Treasury on bond loan	1,000,000.00	1,000,000.00
Net reclamation fund	10,628,676.51	164,286,259.94

Sources.	Receipts for fiscal year 1921.	Receipts to date.
Special funds:		
Judgment Court of Claims	$5,150.00	$450,118.65
Rio Grande Dam		1,000,000.00
Increase of compensation (net)	710,649.14	1,873,383.89
Drainage and cutover		100,000.00
Yuma Auxiliary	54,393.55	54,393.55
Total special	770,192.69	3,477,896.09
Collections—		
Rio Grande Dam		91.78
Drainage and cutover	15.00	464.51
Yuma Auxiliary	424,080.63	424,080.63
Total	424,095.63	424,636.92
Total fund	11,822,964.83	168,188,792.95

During the fiscal year 1921 the reclamation fund has been augmented by receipts from potassium and oil-leasing royalties, under the acts of October 2, 1917, and February 25, 1920, respectively. The operations have slightly further expanded by the beginning of work on what is known as the Yuma (Arizona) Auxiliary project. This project is being constructed under the authority of the act of January 25, 1917, the funds therefor being made available in advance by sale of lands and water rights. The two amounts given above, $54,393.55 and $424,080.63, represent the proceeds from the sale of lands credited to the fund through the United States Land Office, and advance payments on account of water rights handled by special fiscal agents of the Reclamation Service.

The foregoing includes a special appropriation of $100,000 for the investigation of drainage and timber cutover lands. (See sundry civil act approved July 1, 1918.) This is included in the above statement and in the various consolidated tables following in order that all of the activities of the Reclamation Service may be brought together. There is, however, one phase of the work not included in the consolidations. This has reference to the construction of irrigation projects on Indian reservations, viz, Flathead, Blackfeet, and Fort Peck, all in Montana. These are not included for the reason that the Service is acting as an agent for the Indian Bureau and the appropriations are made for the Indian Bureau and not the Reclamation Service.

Further details in reference to the various funds will be found in the tables following this discussion.

Table No. 1 is a reconciliation of the Treasury accounts of the reclamation fund with the accounts as kept by the Reclamation Service.

Table No. 2 is a consolidated balance sheet showing the sources from which funds have been made available, expenditures, and unexpended balance.

Table No. 3 brings forward the credits to the reclamation fund from the various sources and details the receipts for the fiscal year by appropriation warrants. It also includes collections, disbursements, and the balance on hand.

Table No. 4 gives the accretions to the reclamation fund from sale of public lands, exclusive of town sites, by States.

Table No. 5 tabulates, by years, all accretions to the reclamation fund. In this table will be found the proceeds from sale of town sites,

the advances from the General Treasury, the collections, and the proceeds from oil-leasing and potassium royalties.

Summing up the matter of funds, it will be noted that the United States has set aside for the work of the Service a total of $131,708,213.89, consisting of reclamation fund, $128,230,317.80, and special funds, $3,477,896.09. The $20,000,000 advanced to the reclamation fund under the act of June 25, 1910, which act is commonly known as "the bond loan," is being returned to the Treasury in annual installments of $1,000,000. During the fiscal year 1921 $1,000,000 was turned back into the Treasury and a like amount will be returned each fiscal year hereafter until the entire amount has been repaid. Deducting the $1,000,000, there remains $130,708,213.29, which may be considered as the status of the reclamation fund as of June 30, 1921. There has been paid back into the reclamation fund, by water users and others, a total of $37,055,942.14. This is held as a revolving fund, being reexpended as authorized by Congress in annual appropriations.

Table No. 5 shows that the accretions to the reclamation fund from the sale of public lands are gradually decreasing, whereas the collections and repayments by water users and others annually increased up to and including the year 1920. The decrease in collections and repayments during 1921 was due to the general financial depression and consequent inability of water users to pay.

APPROPRIATIONS.

Annually Congress appropriates certain amounts for the construction and operation and maintenance of the various projects and miscellaneous investigations. Although this congressional action is referred to as an appropriation, it is more in the nature of an authorization for the expenditure of funds already set aside by the reclamation law. There are therefore two limitations on the expenditures: First, the appropriations or authorizations by Congress, and second, the condition of the reclamation fund.

Table No. 10 gives the status of the authorizations, showing the amounts specified by Congress, plus collections, etc., all expenditures and liabilities, and the unencumbered balance. This table is designed to exhibit the fact that the expenditures and liabilities have not exceeded the congressional authorizations, but it does not indicate what effect the expenditures have had upon the reclamation fund. By reference to Table No. 3 it will be seen that at the close of the year there was on hand a cash balance of $4,065,530.03, which is more than sufficient to take care of current and deferred liabilities amounting to $1,632,989.88 (see consolidated balance sheet, Table No. 12). A control is kept in the Washington office, from which it can be ascertained whether the field offices are expending more than the amounts authorized by Congress, and from which it can be ascertained whether the expenditures and liabilities as a whole are in excess of the reclamation fund. The process of crediting the reclamation fund in the Treasury requires several weeks. It is frequently important to obtain in advance a knowledge of the amounts in transit. As soon as definite figures can be secured from the Treasury, General Land Office, and other sources, they are taken into account, so that the books will reflect the status of funds as nearly as possible. This results in a difference between the Reclamation Service records

and those of the Treasury, as will be noted by reference to some of the fund tables.

With the exception of the authorizations for expenditures from the reclamation fund few appropriations have been made. These other appropriations consist of $1,000,000 to help in the construction of the Rio Grande Dam, in compliance with a treaty with Mexico; $100,000 to investigate drainage and cut-over timber land; $450,118.65 to settle United States Court of Claims judgments; and an amount necessary to take care of "increase of compensation" authorized by various acts.

During the fiscal year 1921 some expenditures were made from and liabilities incurred chargeable to the 1922 appropriations, as a result of the fact that the act of March 4, 1921, made the 1922 appropriations immediately available. Table No. 11 shows the status of the 1922 appropriations for the projects finding it necessary to use these funds.

INVESTMENT.

Tables 6, 7, and 8 tabulate the expenditures, collections, and net investment of the United States of the various funds. Table No. 9 summarizes the voucher transactions for the fiscal year and to date. The grand totals for the year and to date are as follows:

	Fiscal year, 1921.	To date.
Disbursements	$10,034,148.74	$163,361,048.81
Collections	4,126,229.57	37,490,217.59
Net investment	5,907,919.17	125,870,831.22

The net investment of $125,870,831.22 does not represent the amount set aside by the United States Treasury for the work being carried on by the Reclamation Service, but the amount actually disbursed by the Service less the amount actually returned in cash. This net investment, however, plus the cash on hand in the Treasury and with fiscal agents, would fully balance the outlay from the General Treasury, without, of course, taking into consideration liabilities shown on the project consolidated balance sheet.

A matter of considerable interest is the extent to which the United States has been safeguarded in its investment. The consolidated balance sheet, Table No. 12, shows tangible values as follows:

Materials and supplies on hand	$1,572,342.47
Value of plant	2,981,150.25
Net construction cost	130,691,190.98
Total	135,244,683.70

The operations of the Reclamation Service are in a measure analagous to those of a manufacturing concern, the manufactured article being irrigation projects. Hence the net cost of an irrigation project is a tangible asset. These projects are, however, in the process of being sold, the contracted sales amounting to $84,081,974.95. (Table No. 12, resources for repaying cost of projects.) The difference between this amount and the value of the projects is to be secured in future operations, and represents portions of the projects for which the

service is not ready to make contracts, and to a smaller extent the portions for which water-right applications or contracts have not yet been made.

COST.

Table No. 13 shows, by projects, the gross and net cost of each project for both construction and operation and maintenance. The gross construction cost includes operation and maintenance during the construction period and certain items of cost transferred from operation and maintenance to be paid as a part of the construction. Revenues include rentals of irrigation water, buildings, etc. The difference between the gross cost and revenues represents the net construction cost, which amount is to be covered by formal water-right contracts.

The gross operation and maintenance cost excludes certain items which have been added to construction cost. The revenues include not only miscellaneous items such as rentals of buildings but the regular operation and maintenance accruals. The net cost therefore represents that portion of the cost not covered by book charges against water users and others. The statement gives the status as of December 31, 1920, as all cost since that date will be included in the annual assessments at the close of the calendar year 1921. Where deficits are shown arrangements have been made, in most cases with the consent of the water users, to liquidate them by adding a portion of the deficit to each year's assessments for several years.

The following is a summary of construction cost for the fiscal year and to June 30, 1921, and operation and maintenance cost for the calendar year 1920 and to December 31, 1920:

	Fiscal year 1921.	To date.
Construction:		
Cost	$6,202,017.11	$140,199,968.44
Revenues	500,029.95	9,508,777.46
Net	5,701,987.16	130,691,190.98

See Tables Nos. 13 and 14.

	Calendar year 1920.	To Dec. 31, 1920.
Operation and maintenance:		
Cost	$2,508,733.77	$12,104,015.67
Revenues and repayments	2,151,469.41	9,819,775.67
Deficit	357,264.36	2,284,240.00

See Tables Nos. 13 and 15.

The status of operation and maintenance to June 30, 1921, is as follows:

Gross cost	$13,654,158.54
Revenues	10,275,219.35
Net	3,378,939.19

The net is made up of the following:

Deficit to Dec. 31, 1920	$2,284,240.00
Net cost Jan. 1 to June 30, 1921	1,094,699.19

See consolidated balance sheet, Table No. 12.

REPAYMENTS.

By repayments is meant the collections by the Reclamation Service. The miscellaneous collections for the sale of materials, supplies, meals, mercantile stock, rentals of buildings, irrigation water, etc., are added to the congressional appropriations and reexpended without further authority. The collections to repay the cost of constructing and operating and maintaining irrigation projects can not be reexpended without definite authority of Congress. All collections, however, are credited in the Treasury to the reclamation fund except those applicable to other special funds. The total collections as shown by Tables Nos. 9 and 17 are as follows:

	Fiscal year 1921.	To date.
Creditable to reclamation fund	$3,698,554.50	$37,055,942.14
Creditable to increase of compensation fund	3,579.44	9,638.53
Creditable to Yuma Auxiliary fund	424,080.63	424,080.63
Creditable to Rio Grande Dam appropriation	.....	91.78
Creditable to drainage and cutover appropriation	15.00	464.51
Total	4,126,229.57	37,490,217.59

Tables 18 and 19 are intended to show the status of accrued charges of all classes. A summary of the totals to date is as follows:

Class.	Debits.	Credits.	Balance.
Construction	$12,268,578.20	$10,976,611.05	$1,291,967.15
Operation and maintenance	9,339,638.28	7,856,239.32	1,483,398.96
Supplemental construction	151,549.28	117,953.48	33,595.80
Irrigation water rentals	6,775,266.87	6,597,330.87	177,936.00
Power and light	2,082,791.88	2,041,280.12	41,511.76
Grazing land	673,670.89	630,190.37	43,480.52
Freight refunds	241,632.57	239,239.88	2,392.69
Miscellaneous	2,934,131.64	2,524,735.61	409,396.03

In percentage the uncollected construction figures 10.5 and operation and maintenance 15.9. There is always a considerable amount uncollected because the law permits deferment, but there is a penalty attached thereto. The percentage of uncollected is now somewhat larger than usual owing to the general financial depression during the present fiscal year.

TABLE No. 1.—*Reconciliation of balance of reclamation fund with Treasurer of the United States, June 30, 1921.*

Item.	Appropriation.[1]	Withdrawals.[2]	Balance.
Total and balance, end of fiscal year 1920, as per Nineteenth Annual Report, Table 3, p. 56	$120,571,805.31	$118,220,574.45	$2,351,230.86
Appropriation warrant No. 59, fiscal year 1920	25,637.39	.....	25,637.39
Reclamation fund, fiscal year 1921	6,885,042.02	5,976,665.37	908,376.65
Total and balance, as per statement of Treasury Department	127,482,484.72	124,197,239.82	3,285,244.90
For items in Reclamation Service accounts, but not included in above:			
Accretions on account of collections by fiscal agents and the auditor	.....	[3] 88,590.41	88,590.41
Withdrawals on direct settlements by the auditor and advances to fiscal agents	.....	53,632.37	[3] 53,632.37
Excess appropriation warrant No. 67 not in Treasury accounts	239,827.10	.....	239,827.10
Total	127,722,311.82	124,162,281.71	3,560,030.04

[1] Appropriation represents amounts covered into the reclamation fund by appropriation warrants and includes sales of public lands, sale of town-site lots, and the special appropriation of $20,000,000 loan.
[2] Withdrawals include amounts expended from the reclamation fund, less repayments to the fund (collection vouchers).
[3] Contra.

TABLE No. 2.—*The United States Reclamation Service consolidated balance sheet of cash, investment, and capital funds, June 30, 1921.*

	Fiscal year 1921.		Balance.	Subtotal.	Total.
	Debit.	Credit.			
Group No. 1—Cash					$4,331,921.79
1. Funds with Treasurer United States				$3,802,785.29	
Reclamation fund	[1]$1,198,011.50		$3,560,030.04		
Drainage and cut-over appropriation	15.00		205.93		
Yuma Auxiliary fund	[2] 356,085.20	[3] $113,879.15	242,206.05		
Cash with Treasurer unadjusted	[1] 23,568.98		343.27		
2. Funds to credit of fiscal agents				529,136.50	
Reclamation fund	[4]12,281,840.03	12,260,623.31	505,499.99		
Yuma Auxiliary fund	[4] 573,037.29	549,400.78	23,636.51		
Group No. 2—Investment: Projects net					125,870,831.22
5. Disbursement vouchers				163,361,048.81	
Reclamation fund	9,102,138.54		159,714,925.76		
Increase compensation fund	714,228.58		1,883,022.42		
Drainage and cut-over appropriation			100,258.58		
Yuma Auxiliary fund	212,631.62		212,631.62		
Judgment, Court of Claims	5,150.00		450,118.65		
Rio Grande Dam appropriation			1,000,091.78		
6. Transfer vouchers received				8,635,427.66	
Reclamation	778,786.86		8,534,925.55		
Increase compensation	36,469.31		100,502.11		
Less:					
7. Collection vouchers				[5]37,490,217.59	
Reclamation fund			37,055,942.14		
Repayment water-right charges		2,742,532.27			
Miscellaneous collections	[6] 18,259.85	1,467,611.71			
Increase compensation fund		3,579.44	9,638.53		
Yuma Auxiliary fund		424,080.63	424,080.63		
Drainage and cut-over appropriation		15.00	464.51		
Rio Grande Dam appropriation			91.78		
9. Transfer vouchers issued				[5] 8,635,427.66	
Reclamation		778,786.86	8,534,925.55		
Increase compensation		36,469.31	100,502.11		
					130,202,753.01
Group No. 3—Capital fund					130,202,753.01
Sale of public lands		2,466,273.08	102,544,748.76	102,544,748.76	
Sale of town-site lots		56,388.93	549,718.56	549,718.56	
Potassium deposits, royalties, and rentals		12,724.47	12,724.47	12,724.47	
Proceeds under oil-leasing act				4,617,665.13	
Past production		3,839,000.24	3,839,000.24		
Future production		778,664.89	778,664.89		
Bond loan			20,000,000.00	19,000,000.00	
Less repayments	1,000,000.00		[5] 1,000,000.00		
Rio Grande Dam appropriation			1,000,000.00	1,000,000.00	
Net increase compensation	[7] 3,579.44	[8] 714,228.58	1,873,383.89	1,873,383.89	
Judgment, Court of Claims		5,150.00	450,118.65	450,118.65	
Yuma Auxiliary fund (land sales)		54,393.55	54,393.55	54,393.55	
Drainage and cut-over appropriation			100,000.00	100,000.00	
Totals	26,303,802.20	26,303,802.20			130,202,753.01

[1] Net transactions for fiscal year.
[2] Gross accretions to fund.
[3] Gross withdrawals from fund.
[4] Gross accountability.
[5] Contra.
[6] Adjustment town-site sales credited in error.
[7] Collection overpayment.
[8] Gross expenditures.

TABLE NO. 3.—*Reclamation fund account to June 30, 1921.*

	Sale of public lands.	Sale of town-site lots.	Proceeds oil-leasing act.		Potassium deposits, royalties, and rentals.	Bond loan.	Subtotal.	Miscellaneous collections and re-payments.	Total.
			Past production.	Future production.					
Total end of fiscal year as per Nineteenth Annual Report—Table No. 4, p. 56	$100,078,475.68	$493,329.63				$20,000,000.00	$120,571,805.31	$32,864,958.01	$153,435,863.32
Receipts during fiscal year 1921:									
Appropriation warrants—									
No. 59, June 30, 1920		19,076.98			$6,560.41		25,637.39		25,637.39
No. 10, July 31, 1920	68,894.87						68,894.87		68,894.87
No. 13, Aug. 9, 1920	221,720.11						221,720.11		221,720.11
No. 15, Sept. 28, 1920	111,526.73						111,526.73		111,526.73
No. 21, Sept. 30, 1920	126.00	9,458.65			2,240.63		11,818.68		11,818.68
No. 19, Oct. 12, 1920	110,858.18						110,858.18		110,858.18
No. 22, Nov. 3, 1920	93,823.86						93,823.86		93,823.86
No. 25, Dec. 1, 1920	249,340.52						249,340.52		249,340.52
No. 30, Dec. 31, 1920		13,456.81	$78,686.86	$370.65	1,370.50		93,884.82		93,884.82
No. 31, Jan. 5, 1921	273,316.78						273,316.78		273,316.78
No. 33, Jan. 22, 1921			610,362.11				610,362.11		610,362.11
No. 35, Feb. 8, 1921	142,525.60						142,525.60		142,525.60
No. 39, Mar. 5, 1921	80,813.66						80,813.66		80,813.66
No. 44, Mar. 31, 1921		4,048.15	725,247.70	85,182.50			814,478.35		814,478.35
No. 45, Apr. 1, 1921	179,435.32						179,435.32		179,435.32
No. 50, May 5, 1921	74,411.38						74,411.38		74,411.38
No. 57, June 13, 1921	59,116.50						59,116.50		59,116.50
No. 67, June 30, 1921		9,716.34	2,021,187.32	656,800.89	1,010.00	1,000,000.00	3,688,714.55		3,688,714.55
Withheld to repay bond loan	800,000.00		200,000.00			[1] 1,000,000.00			
Adjustment estimated amount warrant No. 67			203,516.25	36,310.85	[1] 1,329.83		238,497.27		238,497.27
Collection as per Table No. 5								4,191,884.13	4,191,884.13
Direct credits, auditor's adjustments, etc	369.57	632.60			2,872.76		3,874.93		3,874.93
	102,544,748.76	549,718.56	3,839,000.24	778,664.89	12,724.47	20,000,000.00	127,724,856.92	37,055,942.14	164,780,799.06
Less:									
Repayment to bond loan						1,000,000.00	1,000,000.00		1,000,000.00
Disbursements as per Table No. 6									159,714,925.76
Erroneous settlement by Treasury Department as per Table No. 2									343.27
Total									160,715,269.03
Balance in reclamation fund									4,065,530.03

[1] Contra.

TABLE No. 4.—*Reclamation fund accretions from the sale of public lands.*

State.	Receipts from sales of public land, exclusive of town-site sales, actually transferred to credit of reclamation fund.	
	Fiscal year 1921.	To June 30, 1921.
Arizona	$154,187.92	$1,901,296.54
California	202,973.99	6,967,601.92
Colorado	270,639.51	9,203,105.38
Idaho	146,764.55	6,445,920.44
Kansas	284.62	1,035,251.29
Montana	408,106.78	14,177,229.34
Nebraska	21,121.21	2,068,435.46
Nevada	58,731.61	830,298.42
New Mexico	223,543.25	5,349,326.43
North Dakota	[1] 630.88	12,211,135.71
Oklahoma	22,033.79	5,924,740.54
Oregon	124,965.94	11,444,440.42
South Dakota	64,653.43	7,616,789.89
Utah	246,985.41	3,229,393.42
Washington	30,999.04	7,203,025.84
Wyoming	490,912.91	6,936,757.72
Total credited to reclamation fund by Treasury	[2] 2,466,273.08	102,544,748.76
Not taken into account by Treasury:		
Adjustment 20 per cent withheld from 1920 sales	208,921.97	.....
Land office sales, fiscal year 1921	296,538.91	505,460.88
Total	2,971,733.96	103,050,209.64

[1] Contra. [2] Includes $221,720.11, June, 1920, land sales.

TABLE NO. 5.—*Accretions to the reclamation fund from all sources to June 30, 1921.*[1]

Fiscal year.	Sale of public lands.			Sale of town lots.	Proceeds oil-leasing act.		Potassium deposits, royalties, and rentals.	Bond loan.	Subtotal.	Miscellaneous collections and repayments.	Total.
	Total receipts.	Per cent credited.	Net amount.		Past production.	Future production.					
	$3,618,546.38	86.908	$3,144,821.91						$3,144,821.91		$3,144,821.91
	5,115,619.61	89.637	4,585,520.53						4,585,520.53		4,585,520.53
1901	9,395,741.68	92.744	8,713,996.60						8,713,996.60	$242.37	8,714,238.97
1902	7,605,978.29	89.748	6,826,253.59						6,826,253.59	710.84	6,826,964.43
1903	5,328,084.07	90.192	4,805,515.39						4,805,515.39	1,338.85	4,806,854.24
1904	5,732,554.35	90.122	5,166,336.50						5,166,336.50	22,924.63	5,189,261.13
1905	8,471,757.75	93,417	7,914,131.71	$61,535.00					7,975,666.71	96,449.45	8,072,116.16
1906	10,235,294.28	92.137	9,430,573.98	12,864.06					9,443,438.04	518,102.14	9,961,540.18
1907	8,391,938.83	92.415	7,755,466.81	10,017.85					7,765,484.66	754,400.58	8,519,885.24
1908	7,679,421.61	91.521	7,028,185.73	60,112.86					7,088,298.59	1,722,578.27	8,810,876.86
1909	6,631,000.12	92.528	6,135,547.76	69,468.80					6,205,016.56	2,034,338.99	8,239,355.55
1911	6,324,012.34	89.460	5,657,498.88	15,224.10					5,672,722.98	2,454,823.70	8,127,546.68
1912	4,202,946.67	88.935	3,737,910.55	17,784.74					3,755,695.29	2,360,113.62	6,115,808.91
1913	4,058,991.61	85.229	3,460,451.63	15,280.25				$3,500,000.00	6,975,731.88	2,742,158.47	9,717,890.35
1914	3,719,754.90	87.856	3,268,057.73	18,436.28				8,500,000.00	11,786,494.01	2,391,070.74	14,177,564.75
1915	3,186,239.81	83.109	2,648,057.74	21,189.28				3,500,000.00	6,169,247.02	2,349,018.78	8,518,265.80
1916	3,290,671.99	87.076	2,865,386.34	31,250.15				1,500,000.00	4,396,636.49	3,182,233.08	7,578,869.57
1917	2,995,695.57	86.113	2,552,650.65	60,990.56				3,000,000.00	5,613,641.21	3,459,446.00	9,073,087.21
1918	2,449,371.08	80.000	1,959,496.88	55,362.49					2,014,859.37	3,862,224.67	5,877,084.04
1919	3,305,418.54	80.000	2,644,334.88	43,813.21					2,688,148.09	4,911,882.83	7,600,030.92
1920	3,089,634.31	89.000	[2] 2,750,013.85	56,388.93	$3,839,000.24	$778,664.89	$12,724.47	[4] 1,000,000.00	6,436,792.38	4,191,884.13	10,628,676.51
1921											
	114,828,673.79	90.000	[3] 103,050,209.64	549,718.56	3,839,000.24	778,664.89	12,724.47	19,000,000.00	127,230,317.80	37,055,942.14	164,286,259.94

[1] This table shows land office collections by fiscal years regardless of when credited to the reclamation fund by the Treasury.

[2] Table No. 4	$2,971,733.96
Taken into Washington office books during fiscal year 1920	221,720.11
Taken into Washington office books during fiscal year 1921	2,750,013.85
[3] Table No. 3	$102,544,748.76
Table No. 4 (not taken into account by Treasury)	505,460.88
	103,050,209.64

[4] Contra. Repayment to bond loan.

TABLE NO. 6.—*Voucher transactions and net investment of the United States as of June 30, 1921, from the appropriation, "Reclamation fund."*

State and project.	Debits.				Credits.				Net investment of the United States.	
	Disbursement vouchers.		Transfers received.		Collected vouchers.		Transfers issued.			
	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.
Arizona: Salt River	.....	$14,238,082.26	.....	$491,235.74	.....	$4,733,326.28	.....	$67,284.04	.....	$9,928,707.68
Arizona-California: Yuma	$382,138.36	10,835,578.40	$29,112.92	405,001.81	$430,149.86	2,204,971.45	$17,149.86	125,114.12	[1] $36,048.44	8,910,494.64
Arizona:										
Boulder Canyon	63,615.99	63,615.99	34,940.98	34,940.98	35,293.23	35,293.23	25,652.25	25,652.25	37,611.49	37,611.49
Imperial Valley	39,020.30	39,020.30	28,223.71	28,223.71	45,650.85	45,650.85	16,385.56	16,385.56	5,207.60	5,207.60
California: Orland	88,700.51	1,232,997.67	6,484.26	76,169.30	89,997.81	405,093.97	274.47	6,555.34	4,912.49	897,517.66
Colorado:										
Grand Valley	180,249.38	3,796,570.12	9,342.99	196,208.72	50,435.96	209,157.23	1,256.20	24,956.25	137,900.21	3,758,665.36
Uncompahgre	171,716.01	7,577,998.82	9,586.96	228,815.53	72,893.06	1,171,326.54	328.99	42,947.99	108,080.92	6,592,539.82
Idaho:										
Boise	661,352.31	14,374,789.78	34,608.73	578,901.85	541,074.54	2,975,072.42	3,210.10	193,046.11	151,676.40	11,785,573.10
King Hill	316,133.73	1,178,391.82	24,053.61	99,747.17	16,660.40	38,203.57	8,216.66	16,144.04	315,310.28	1,223,791.38
Minidoka	521,312.43	8,186,595.26	81,814.70	593,088.52	433,544.92 [1] 171,824.35	3,770,158.55	421.91	268,320.27	340,984.65	4,741,204.96
Kansas: Garden City	.....	380,291.22	.....	12,852.83	6,205.86	57,133.88	.....	11,929.26	[1] 6,205.86	324,080.91
Montana:										
Huntley	96,965.52	2,358,287.59	5,388.72	128,272.83	61,625.51 [1] 57,172.98	665,632.23	2,920.83	175,613.08	94,980.88	1,645,315.11
Milk River	232,502.12	3,627,301.39	17,338.22	213,482.05	34,336.09 [1] 40,582.40	168,432.45	2,540.48	41,627.52	253,546.17	3,630,723.47
St. Mary storage	99,973.66	2,628,984.98	6,204.41	248,591.45	8,964.62	98,100.29	2,568.25	60,454.52	94,645.20	2,719,021.62
Sun River	126,751.01	4,070,379.95	11,349.80	231,515.45	31,896.64 [1] 12,198.16	375,625.16	1,704.95	81,154.25	116,697.38	3,845,115.99
Montana-North Dakota: Lower Yellowstone	81,525.55	3,622,712.41	6,263.69	138,160.37	18,055.58	266,765.02	9,545.89	52,010.09	60,187.77	3,442.097.67
Nebraska-Wyoming: North Platte	1,296,487.72	13,380,557.52	70,064.62	579,634.23	530,598.51	2,905,797.36	11,789.29	54,501.78	824,164.54	10,999,892.61
Nevada: Newlands	233,445.13	7,249,904.47	18,220.63	383,664.46	145,966.89	1,286,408.91	1,306.41	63,098.54	104,392.46	6,284,061.48
New Mexico:										
Carlsbad	89,265.45	1,782,320.88	5,895.70	89,608.65	57,708.03	647,847.44	1,055.35	29,737.95	36,397.77	1,194,344.14
Hondo	.....	392,784.15	.....	14,960.97	.....	34,841.70	.....	1,000.76	.....	371,902.66
New Mexico-Texas: Rio Grande	1,309,472.02	10,997,327.17	71,498.82	647,261.37	258,484.08	1,584,566.11	18,843.07	161,591.79	1,103,643.69	9,898,430.64
Oregon: Deschutes	2,040.16	2,040.16	.....	.....	.....	.....	7,407.29	7,407.29	[1] 5,367.13	[1] 5,367.13
North Dakota: North Dakota pumping	98,193.14	1,347,363.54	5,942.47	219,516.21	49,088.33	314,335.43	4,673.99	205,255.30	50,373.29	1,047,289.02
Oregon: Umatilla	143,725.42	3,042,529.48	58,122.30	180,593.67	51,662.54	692,659.64	39.69	101,255.18	150,145.49	2,429,208.33
Oregon-California: Klamath	345,758.30	3,793,292.61	21,766.80	149,445.43	102,574.02	957,611.14	112.16	33,225.73	264,838.92	2,951,901.17
South Dakota: Belle Fourche	172,548.95	4,242,710.31	10,957.36	137,351.86	112,750.51 [1] 68,702.75	971,823.56	385.00	40,836.59	139,073.55	3,367,402.02
Utah: Strawberry Valley	133,076.90	3,954,726.91	13,096.72	175,756.48	172,619.28	797,445.66	4,906.87	66,323.14	[1] 31,352.53	3,266,714.59

Washington:										
Okanogan	265,847.25	1,529,800.13	14,149.43	92,313.93	54,729.65	280,895.72	1,859.20	13,322.80	223,407.83	1,327,895.54
Yakima	453,022.72	12,588,187.86	26,737.78	1,001,635.54	557,816.94	4,705,557.53	6,200.62	518,375.43	[1] 84,257.06	8,365,890.44
Wyoming:										
Riverton	139,310.37	154,537.72	11,829.44	12,906.54	813.78	17,021.93	1,167.94	1,247.98	149,158.09	149,174.35
Shoshone	711,778.77	7,017,118.18	72,292.69	360,540.72	117,278.17 [1] 161,108.84	1,092,927.53	4,540.09	66,074.13	823,362.04	6,218,657.24
Secondary	64,614.46	1,288,881.54	38,518.44	284,353.10	66,171.41	218,684.35	107,824.53	220,286.96	[1] 70,863.04	1,134,263.33
Denver office	289,459.51	1,288,022.73	21,698.08	103,311.46	19,862.67	95,988.19	249,584.47	1,211,128.67	41,710.45	84,217.33
Washington office	269,350.39	4,519,208.47	13,281.88	161,038.93	35,234.24	233,757.58	247,989.31	4,366,912.24	[1] 591.28	79,577.58
Indian:										
Blackfeet		926,221.94		109,379.18		951,160.63		84,440.49		
Flathead		1,542,342.79		85,547.50		1,581,295.96		46,594.33		
Fort Peck		440,664.24		40,897.01		465,372.65		16,188.60		
Civil service retirement and disability fund	22,785.00	22,785.00					16,925.18	16,925.18	5,859.82	5,859.82
Total	9,102,138.54	159,714,925.76	778,786.86	8,534,925.55	[2] 3,698,554.50	37,055,942.14	778,786.86	8,534,925.55	5,403,584.04	122,658,983.62

[1] Contra, being receipts from town-site sales eliminated from project investment.

[2] Actual collections	$4,210,143.98
Town-site sales during fiscal year 1921 eliminated	18,259.85
	4,191,884.13
Town-site sales prior to fiscal year 1921 eliminated	493,329.63
	3,698.554.50

TABLE No. 7.—*Voucher transactions and net investment of the United States as of June 30, 1921, from the appropriation, "Increase of compensation."*

State and project.	Debits.				Credits.				Net investment.	
	Disbursement vouchers.		Transfers received.		Collection vouchers.		Transfers issued.			
	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.
Arizona:										
Imperial Valley	$2,260.52	$2,260.52	$552.08	$552.08			$376.20	$376.20	$2,436.40	$2,436.40
Salt River		9,043.14		407.14						9,450.28
Yuma Auxiliary	9,142.56	9,142.56							9,142.56	9,142.56
Boulder Canyon	3,910.68	3,910.68	852.21	852.21					4,762.89	4,762.89
Arizona-California: Yuma	36,805.54	106,915.55	1,929.76	5,849.42	$206.05	$211.34	178.81	219.61	38,350.44	112,334.02
California: Orland	7,925.55	19,503.96	475.14	1,436.57		.76			8,400.69	20,939.77
Colorado:										
Grand Valley	18,448.56	56,134.92	843.13	2,963.74		51.20		.67	19,291.69	59,046.79
Uncompahgre	19,036.75	63,602.14	816.12	3,015.83		51.47			19,852.87	66,566.50

TABLE No. 7.—*Voucher transactions and net investment of the United States as of June 30, 1921, from the appropriation, "Increase of compensation"*—Continued.

State and project.	Debits.				Credits.				Net investment.	
	Disbursement vouchers.		Transfers received.		Collected vouchers.		Transfers issued.			
	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.
Idaho:										
Boise	$44,112.25	$120,155.91	$2,171.35	$6,242.58	$6.80	$15.97			$46,276.80	$126,382.52
King Hill	27,308.15	77,089.95	1,492.06	4,638.04	.33	9.00			28,799.88	81,718.99
Minidoka	26,590.92	67,023.95	1,403.47	4,013.63	8.42	20.47		$18.56	27,985.97	70,998.55
Jackson Lake enlargement[1]										
Kansas: Garden City				8.89						8.89
Montana:										
Huntley	7,828.57	23,478.01	410.33	1,298.95	6.00	9.05	[2] $3.56	2.44	8,236.46	24,765.47
Milk River	14,624.32	37,122.56	1,017.83	2,413.67	.38	23.88		13.92	15,641.77	39,498.43
St. Mary storage	7,249.16	25,050.00	363.54	1,212.60		.78	9.42	9.42	7,603.28	26,252.40
Sun River	12,335.75	48,674.19	658.26	2,503.55		5.65		7.67	12,994.01	51,164.74
Montana-North Dakota: Lower Yellowstone	6,855.00	18,666.94	432.64	1,261.15	19.00	35.41	14.66	14.66	7,253.98	19,872.82
Nebraska-Wyoming: North Platte	99,652.24	239,644.17	5,237.27	13,994.89	15.33	18.28			104,874.18	253,623.33
Nevada: Newlands	16,785.19	53,858.71	1,027.03	3,914.23	1.57	29.61			17,810.65	57,737.31
New Mexico: Carlsbad	6,045.06	19,896.98	337.92	1,288.80	10.20	48.47			6,372.78	21,108.40
New Mexico-Texas: Rio Grande	124,655.17	303,556.57	5,519.34	15,204.34	14.55	36.40	13.33	110.34	130,146.36	318,614.17
North Dakota: North Dakota pumping	5,910.42	16,161.45	301.25	992.01	4.87	10.86			6,206.80	17,142.60
Oregon:										
Umatilla	10,788.80	25,154.10	664.45	1,657.76	1.67	1.67			11,451.58	26,810.19
Deschutes	1.67	1.67							1.67	1.67
Oregon-California: Klamath	19,207.18	40,783.84	1,180.24	2,665.29	6.68	36.09			20,380.74	43,413.04
South Dakota: Belle Fourche	14,363.31	31,936.51	852.95	1,895.44		6.21			15,216.26	33,825.74
Utah: Strawberry Valley	11,467.52	22,365.63	515.74	1,464.15	1.00	14.46	418.72	428.17	11,563.54	23,387.15
Washington:										
Okanogan	17,212.89	34,953.76	829.16	2,164.71	8.14	15.43			18,033.91	37,103.04
Yakima	48,389.77	175,764.39	1,840.73	7,566.46	2.72	142.97		16.75	50,227.78	183,171.13
Wyoming:										
Riverton	4,736.19	4,952.64	488.62	488.62		1.50			5,224.81	5,439.76
Shoshone	47,992.17	102,828.70	3,007.87	5,862.58	6.60	6.60	[2] .24	1.09	50,993.68	108,683.59
Secondary projects consolidated	3,871.14	11,123.10	1,227.10	2,522.51		.77			5,098.24	13,644.84
Washington office and Denver office, general expense	38,715.58	111,536.28	21.72	150.27	3,259.13	8,834.23	35,461.97	99,196.65	16.20	3,655.67
Drainage and cut-over		728.94								728.94
Indian: Flathead								85.96		[2] 85.96
Total	714,228.58	1,883,022.42	36,469.31	100,502.11	3,579.44	9,638.53	36,469.31	100,502.11	710,649.14	1,873,383.89

[1] Included in Minidoka.

[2] Contra.

TABLE NO. 8.—*Voucher transactions and net investment of the United States as of June 30, 1921, from special appropriations.*

Appropriation, State, and project.	Disbursements.		Collections.		Net investment.	
	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.
Judgments, Court of Claims:						
Idaho—Minidoka		$15,550.90				$15,550.90
Kansas—Garden City		9,271.86				9,271.86
Montana—						
Milk River		1,630.73				1,630.73
St. Mary storage		1,043.91				1,043.91
Sun River		1,585.35				1,585.35
Lower Yellowstone		6.10				6.10
Nebraska—North Platte	$5,150.00	26,425.67			$5,150.00	26,425.67
Utah—Strawberry Valley		440.00				440.00
Washington—Yakima		71,999.46				71,999.46
Wyoming—Shoshone		322,164.67				322,164.67
Subtotal	5,150.00	450,118.65			5,150.00	450,118.65
Special, New Mexico, Rio Grande		1,000,091.78		$91.78		1,000,000.00
Special, drainage and cut over [1]		100,258.58	$15.00	464.51		99,794.07
Yuma Auxiliary	212,631.62	212,631.62	424,080.63	424,080.63	[2] 211,449.01	[2] 211,449.01
Total	217,781.62	1,763,100.63	424,095.63	424,636.92	[2] 206,299.01	1,338,463.71

[1] Drainage and cut-over disbursements and collections were made prior to fiscal year 1921, but were not included in Nineteenth Annual Report.
[2] Contra.

TABLE NO. 9.—*Summary of voucher transactions and net investments from all sources as of June 30, 1921.*

Appropriation.	Disbursements.		Transfers received.	
	Fiscal year 1921.	To June 30, 1920.	Fiscal year 1921.	To June 30, 1921.
Reclamation fund	$9,102,138.54	$159,714,925.76	$778,786.86	$8,534,925.55
Increase of compensation	714,228.58	1,883,022.42	36,469.31	100,502.11
Special:				
Yuma Auxiliary	212,631.62	212,631.62		
Judgment, Court of Claims	5,150.00	450,118.65		
Rio Grande Dam		1,000,091.78		
Drainage and cut over		100,258.58		
Total	10,034,148.74	163,361,048.81	815,256.17	8,635,427.66

Appropriation.	Collections.		Transfers issued.		Net investment.	
	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.
Reclamation fund	[1] $3,698,554.50	$37,055,942.14	$778,786.86	$8,534,925.55	$5,403,584.04	$122,658,983.62
Increase of compensation	3,579.44	9,638.53	36,469.31	100,502.11	710,649.14	1,873,383.89
Special:						
Yuma Auxiliary	424,080.63	424,080.63			[2] 211,449.01	[2] 211,449.01
Judgment, Court of Claims					5,150.00	450,118.65
Rio Grande Dam		91.78				1,000,000.00
Drainage and cut over	15.00	464.51			15.00	99,794.07
Total	4,126,229.57	37,490,217.59	815,256.17	8,635,427.66	5,907,919.17	125,870,831.22

[1] Actual collections, Table No. 5	$4,191,884.13
Town-site sales eliminated	493,329.63
Net	3,698,554.50

[2] Contra.

TABLE NO. 10.—*Appropriations by projects, for the fiscal year 1921, showing increases and decreases authorized, liabilities and expenditures, and balance unencumbered.*

Project.	Direct appropriation.	10 per cent added.	10 per cent deducted.	Unexpended appropriation, previous years.	Special appropriations.	Collections and transfers.	Increase of compensation.	Total available for expenditures.	Total registered liabilities.	Total expenditures.	Total liabilities and expenditures.	Balance.
Salt River	$1,000.00							$1,000.00				$1,000.00
Yuma	435,000.00					$136,388.82	$34,714.41	606,103.23	$44,821.15	$395,488.71	$440,309.86	165,793.37
Yuma Auxiliary					[1]$58,754.22	424,080.63	9,142.56	491,977.41	309,527.28	221,774.18	531,301.46	[2] 39,324.05
Orland	120,000.00					7,261.28	7,775.04	135,036.32	4,155.36	94,453.79	98,609.15	36,427.17
Grand Valley	208,000.00					51,692.16	17,896.88	277,589.04	18,595.60	191,523.62	210,119.22	67,469.82
Uncompahgre	174,000.00					73,192.05	18,802.46	265,994.51	18,121.48	176,216.37	194,337.85	71,656.66
Boise	774,000.00					34,319.82	43,062.58	851,382.40	39,070.89	690,335.56	729,406.45	121,975.95
King Hill	320,000.00	$32,000.00				24,877.06	28,294.97	405,172.03	10,533.78	355,998.60	366,532.38	38,639.65
Minidoka	317,000.00			$730,810.06		183,906.88	26,328.95	1,258,045.89	114,375.18	559,848.65	674,223.83	583,822.06
Huntley	129,000.00					8,995.24	7,244.44	145,239.68	6,112.84	92,416.55	98,529.39	46,710.29
Milk River						32,097.83	14,867.81	617,072.69	47,056.55	244,285.93	291,342.48	216,170.84
Milk River-St. Mary storage unit	552,000.00					11,034.84	7,072.21		4,523.35	105,036.02	109,559.37	
Sun River	148,000.00					13,706.44	11,830.95	173,537.39	20,043.00	133,865.43	153,908.43	19,628.96
Lower Yellowstone	83,000.00					18,137.69	6,709.63	107,847.32	7,078.24	85,786.45	92,864.69	14,982.63
North Platte	1,000,000.00				[3]5,150.00	146,678.39	97,519.33	1,249,347.72	151,267.26	1,057,109.46	1,208,376.72	40,971.00
Newlands	664,000.00		$45,600.00			34,432.25	16,656.76	669,489.01	148,262.74	241,160.13	389,422.87	280,066.14
Carlsbad	108,000.00					15,671.66	6,218.90	129,890.56	8,307.82	95,656.72	103,964.54	25,926.02
Rio Grande	1,000,000.00			1,045,762.96		277,235.47	126,215.13	2,449,213.56	183,211.45	1,360,970.67	1,544,182.12	905,031.44
North Dakota pumping	119,000.00					51,593.90	5,792.66	176,386.56	3,915.48	99,695.18	103,610.66	72,775.90
Deschutes							2.15	2.15		2.15	2.15	
Umatilla	170,000.00					11,697.76	10,951.12	192,648.88	11,205.75	158,118.40	169,324.15	23,324.73
Klamath	289,000.00			598,527.73		43,458.04	19,464.96	950,450.73	85,121.05	355,047.73	440,168.78	510,281.95
Belle Fourche	120,000.00			189,160.19		3,143.33	13,542.34	325,845.86	88,655.63	172,923.58	261,579.21	64,266.65
Strawberry Valley	86,000.00	8,600.00				42,539.52	11,764.12	148,903.64	551.31	125,206.40	125,757.71	23,145.93
Okanogan	666,000.00					5,715.37	16,243.63	687,959.00	26,831.62	220,780.54	247,612.16	440,346.84
Yakima	351,000.00					105,201.83	47,690.53	503,892.36	13,279.99	381,306.85	394,586.84	109,305.52
Riverton	100,000.00					1,981.72	5,305.57	107,287.29	1,840.00	99,723.46	101,563.46	5,723.83
Shoshone	459,000.00			392,820.50		13,114.79	48,469.48	913,404.77	75,704.69	790,647.58	866,352.27	47,052.50
Secondary	[4] 70,000.00	5,000.00		17,185.40		182,738.16	11,468.40	286,391.96	6,750.53	241,151.80	247,902.33	38,489.63
Total	8,463,000.00	45,600.00	45,600.00	2,974,266.84	63,904.22	1,954,892.93	671,047.97	14,127,111.96	1,448,920.02	8,746,530.51	10,195,450.53	3,931,661.43

[1] Proceeds from sale of Yuma auxiliary lands.
[2] Contra.
[3] Judgment Court of Claims.
[4] Includes $20,000 from Kincaid Act.

TABLE No. 11.—*Appropriations, by projects, for the fiscal year 1922, showing expenditures and liabilities incurred during the fiscal year 1921 and balances available July 1, 1922.*[1]

Project.	Direct appropriation.	Expenditures during fiscal year 1921.	Liabilities during fiscal year 1921.	Total expenditures and liabilities.	Balance.
King Hill	$300,000	$3,299.59	$53,136.88	$56,436.47	$243,563.53
Milk River	1,017,000	.....	107,603.84	107,603.84	909,396.16
Sun River	687,000	.....	23,702.64	23,702.64	663,297.36
North Platte	2,115,000	168,404.59	.....	168,404.59	1,946,595.41
North Dakota pumping	115,000	.....	1,213.50	1,213.50	113,786.50
Deschutes	400,000	2,100.07	319.04	2,419.11	397,580.89
Klamath	1,213,000	5.75	.....	5.75	1,212,994.25
Strawberry Valley	144,000	22,673.91	3,231.39	25,905.30	118,094.70
Yakima	2,100,000	117,930.95	55,692.10	173,623.05	1,926,376.95
Riverton	850,000	57,992.59	25,893.90	83,886.49	766,113.51
Shoshone	1,784,000	4,022.12	.....	4,022.12	1,779,977.88
Total	10,725,000	376,429.57	270,793.29	647,222.86	10,077,777.14

[1] Appropriations for reclamation projects for the fiscal year 1922 were, under the act of Mar. 4, 1921, made immediately available.

TABLE No. 12.—*Consolidated financial statement, Reclamation Fund and special fund, June 30, 1921.*

[Exclusive of Indian projects.]

DEBITS.

Cash available:		
With Treasurer of United States—		
Reclamation fund	$3,560,030.04	
Drainage and cut-over	205.93	
Yuma Auxiliary	242,206.05	
Unadjusted items	343.27	
	3,802,785.29	
With fiscal agents—		
Reclamation fund	505,499.99	
Yuma Auxiliary	23,636.51	
	529,136.50	$4,331,921.79
Cash in transit to Treasurer		73,218.72
Materials and supplies		1,572,342.47
Plant and equipment		2,981,150.25
Current accounts receivable:		
Uncollected construction water rights charges accrued	1,291,967.15	
Uncollected operation and maintenance charges accrued	1,483,398.96	
Uncollected supplemental construction charges accrued	33,595.80	
Uncollected miscellaneous	694,478.70	
		3,503,440.61
Deferred accounts receivable:		
Construction water right charges unaccrued	69,620,092.05	
Less—		
Construction water right charges advanced	122,934.75	
		69,497,157.30
Unearned value of contract		533,559.98
Unearned civil service retirement fund		5,859.82
Construction cost:		
Cost of work performed by United States	127,616,015.80	
Work performed by others	403,528.00	
Supplemental construction	3,478,752.41	
Operation and maintenance added to construction	288,391.71	
Operation and maintenance during construction	8,370,284.31	
Undistributed clearing account	42,996.21	
Gross construction cost	140,199,968.44	
Less—		
Revenues and cost adjustments	9,508,777.46	
Net construction cost		130,691,190.98
Operations and maintenance cost:		
Cost of work performed by United States	13,934,481.38	
Cost of work performed by others	1,503.86	
Undistributed clearing accounts	6,565.01	
Total	13,942,550.25	
Less—		
Operation and maintenance added to construction	288,391.71	
Revenues and cost adjustments	10,275,219.35	
	10,563,611.06	

Operations and maintenance cost—Continued.		
Less—Continued.		
Net operation and maintenance cost		[1] $3,378,939.19
Undistributed cost of general offices		45,397.27
Disbursement and transfer vouchers in transit—		
Washington office investment control	[2] $171,996,476.47	
Project accounts	171,950,493.77	
		45,982.70
		216,660,161.08

CREDITS.

Reclamation fund:		
Proceeds from sale of public lands	102,544,748.76	
Proceeds from sale of townsite lots	549,718.56	
Potassium deposits, royalties and rentals	12,724.47	
Proceeds from oil-leasing act	4,617,665.13	
Total reclamation fund		107,724,856.92
Special funds—		
Rio Grande Dam	1,000,000.00	
Judgments—Court of Claims	450,118.65	
Yuma Auxiliary land sales	54,393.55	
Drainage and cut-over appropriation	100,000.00	
Increased compensation	1,873,383.89	
Total special funds		3,477,896.09
Bond loan	20,000,000.00	
Less repayments	1,000,000.00	
		19,000,000.00
Current accounts payable:		
Unpaid labor	310,414.80	
Miscellaneous, purchases, etc	716,461.10	
		1,026,875.90
Deferred and contingent liabilities, undelivered orders, unearned value of construction work contracted, etc		606,113.98
Resources for repaying cost, value of water-right contracts, etc		84,081,974.95
Reserves, net power earnings after public notice, forfeitures, penalties, etc		763,482.54
Collections and transfers in transit:		
Washington office investment control	[3] $46,125,645.25	
Project accounts	46,146,684.55	
		[4] 21,039.30
		216,660,161.08

[1] Net deficit to December 31, 1920	$2,284,240.00
Net operation and maintenance cost to June 30, 1921	1,094,699.19
	3,378,939.19
[2] Disbursements	$163,361,048.81
Transfers	8,635,427.66
	171,996,476.47
[3] Transfers	$8,635,427.66
Collections:	
Construction repayments	11,100,637.81
Operation and maintenance repayments	7,880,390.08
Rentals of irrigation water	6,585,868.33
Sale of power and light	2,002,723.76
Unclassified	6,922,768.37
From Indian Bureau	2,997,829.24
	46,125,645.25

[4] Contra.

TABLE No. 13.—*Consolidated statement, by projects, of construction cost and revenue to June 30, 1921, and operation and maintenance cost and revenue to Dec. 31, 1920.*

State and project.	Construction.						Operation and maintenance.					
	Gross cost.		Revenue.		Net cost.		Gross cost.		Revenue.		Deficit.	
	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Calendar year 1920.	To Dec. 31, 1920.	Calendar year 1920.	To Dec. 31, 1920.	Calendar year 1920.	To Dec. 31, 1920.
Arizona:												
Salt River		$15,106,942.10		$4,558,822.82		$10,548,119.28						
Secondary	$16,284.06	70,482.27			$16,284.06	70,482.27						
Total	16,284.06	15,177,424.37		4,558,822.82	16,284.06	10,618,601.55						
Arizona-California:												
Yuma	64,505.30	9,543,777.23	[1] $94,661.50	405,052.50	159,166.80	9,138,724.73	$375,552.78	$1,048,674.69	$242,279.53	$733,497.47	$133,273.25	$315,177.22
Secondary	64.90	208,030.85			64.90	208,030.85						
Auxiliary	180,338.17	180,338.17	7,194.49	7,194.49	173,143.68	173,143.68						
Total	244,908.37	9,932,146.25	[1] 87,467.01	412,246.99	332,375.38	9,519,899.26	375,552.78	1,048,674.69	242,279.53	733,497.47	133,273.25	315,177.22
California:												
Orland	56,482.25	1,145,959.01	6,097.00	130,031.71	50,385.25	1,015,927.30	32,789.39	128,610.28	38,267.89	128,568.33	[2] 5,478.50	41.95
Secondary	53,359.04	177,350.24	111.50	111.50	53,247.54	177,238.74						
Total	109,841.29	1,323,309.25	6,208.50	130,143.21	103,632.79	1,193,166.04	32,789.39	128,610.28	38,267.89	128,568.33	[2] 5,478.50	41.95
Colorado:												
Grand Valley	208,174.14	3,855,712.35	47,062.90	130,613.43	161,111.24	3,725,098.92						
Uncompahgre	244,817.36	7,701,310.87	152,876.73	1,070,830.00	91,940.63	6,630,480.87						
Secondary		18,800.81				18,800.81						
Total	452,991.50	11,575,824.03	199,939.63	1,201,443.43	253,051.87	10,374,380.60						
Idaho:												
Boise	291,690.02	13,186,441.82	4,812.43	782,038.97	286,877.59	12,404,402.85	350,327.39	921,281.94	378,335.08	921,970.18	[2] 28,007.69	[2] 688.24
King Hill	357,352.76	1,212,678.45	4,058.34	2,232.79	353,294.42	1,210,445.66						
Minidoka	501,520.01	7,282,553.65	31,610.56	212,664.08	469,909.45	7,069,889.57	153,454.67	1,151,155.46	208,939.87	1,171,590.47	[2] 55,485.20	[2] 20,435.01
Jackson Lake enlargement					1,110,081.46							
Secondary	[1] 44,448.01	33,237.08			[1] 44,448.01	33,237.08						
Total	1,106,114.78	21,714,911.00	40,481.33	996,935.84	1,065,633.45	20,717,975.16	503,782.06	2,072,437.40	587,274.95	2,093,560.65	[2] 83,492.89	[2] 21,123.25
Kansas: Garden City		395,831.78		10,180.71		385,651.07						

[1] Contra. [2] Excess.

TABLE NO. 13.—*Consolidated statement, by projects, of construction cost and revenue to June 30, 1921, and operation and maintenance cost and revenue to Dec. 31, 1920*—Continued.

State and project.	Construction.						Operation and maintenance.					
	Gross cost.		Revenue.		Net cost.		Gross cost.		Revenue.		Deficit.	
	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Fiscal year 1921.	To June 30, 1921.	Calendar year 1920.	To Dec. 31, 1920.	Calendar year 1920.	To Dec. 31, 1920.	Calendar year 1920.	To Dec. 31, 1920.
Montana:												
Huntley	$37,263.31	$1,466,761.90	$7,698.57	$17,325.18	$29,564.74	$1,449,436.72	$61,962.29	$736,054.10	$60,569.65	$314,367.87	$1,392.64	$421,686.23
Milk River	224,426.06	3,754,182.96	9,788.18	160,514.12	184,637.88	3,593,668.84						
St. Mary storage	89,985.66	2,696,334.08	32,022.04	32,436.60	87,963.62	2,663,897.48						
Sun River	128,303.20	3,982,929.24	12,743.85	131,077.47	115,559.35	3,851,851.77	27,523.49	161,796.44	20,220.56	123,255.79	7,302.93	38,540.65
Lower Yellowstone	[1] 9,204.15	2,910,315.21	12,320.36	38,334.73	[1] 21,524.51	2,871,980.48	95,135.89	764,880.55	[1] 4,710.17	266,115.60	99,846.06	498,764.95
Secondary	843.08	65,919.44			843.08	65,919.44						
Total	471,617.16	14,876,442.83	74,573.00	379,688.10	397,044.16	14,496,754.73	184,621.67	1,662,731.09	76,080.04	703,739.26	108,541.63	958,991.83
Montana-North Dakota: Secondary	9,296.90	9,296.90			9,296.90	9,296.90						
Nebraska-Wyoming: North Platte	1,171,950.89	11,779,478.51	2,544.76	111,908.78	1,169,406.13	11,667,569.73	326,191.01	1,453,788.85	295,978.05	1,388,612.87	30,212.96	65,175.98
Nebraska: Secondary		6,258.71				6,258.71						
Nevada:												
Newlands	33,988.77	6,508,470.52	9,600.42	8,904.04	24,388.35	6,499,566.48	108,071.83	765,060.30	101,980.94	576,622.41	6,090.89	188,437.89
Secondary	[1] 1.50	14,418.92			[1] 1.50	14,418.92						
Total	33,987.27	6,522,889.44	9,600.42	8,904.04	24,386.85	6,513,985.40	108,071.83	765,060.30	101,980.94	576,622.41	6,090.89	188,437.89
Nevada-Arizona: Secondary	77,219.31	77,219.31	446.49	446.49	76,772.82	76,772.82						
New Mexico:												
Carlsbad	28,915.80	1,420,095.22	9,243.36	20,686.08	19,672.44	1,399,409.14	57,443.47	369,592.68	49,948.78	348,397.07	7,494.69	21,195.61
Hondo		381,573.39		9,706.22		371,867.17						
Secondary	1,673.96	56,316.27			1,673.96	56,316.27						
Total	30,589.76	1,857,984.88	9,243.36	30,392.30	21,346.40	1,827,592.58	57,443.47	369,592.68	49,948.78	348,397.07	7,494.69	21,195.61
New Mexico-Texas: Rio Grande	1,240,200.27	11,764,797.51	183,066.54	1,118,911.83	1,057,133.73	10,645,885.68						
North Dakota:												
North Dakota pumping	[1] 23,642.30	696,607.16	1,636.29	11,180.45	[1] 25,278.59	685,426.71	78,856.17	370,745.20	42,546.92	78,140.94	36,309.25	292,604.26
Secondary		57,584.80				57,584.80						
Total	[1] 23,642.30	754,191.96	1,636.29	11,180.45	[1] 25,278.59	743,011.51	78,856.17	370,745.20	42,546.92	78,140.94	36,309.25	292,604.26
Oklahoma: Secondary		83,412.56				83,412.56						

Oregon:												
Umatilla	119,749.52	2,597,308.31	2,097.18	19,646.96	117,652.34	2,577,661.35	47,908.01	396,726.05	56,179.27	280,939.60	[2] 8,271.26	115,786.45
Deschutes	2,363.87	2,363.87	3.00	3.00	2,360.87	2,360.87						
Secondary	3,854.75	201,665.63			3,854.75	201,665.63						
Total	125,968.14	2,801,337.81	2,100.18	19,649.96	123,867.96	2,781,687.85	47,908.01	396,726.05	56,179.27	280,939.60	[2] 8,271.26	115,786.45
Oregon-California: Klamath	204,666.21	3,296,337.05	4,716.39	49,678.74	199,949.82	3,246,658.31	92,511.86	447,173.99	84,046.50	408,943.42	8,465.36	38,230.57
South Dakota:												
Belle Fourche	19,136.33	3,499,275.45	1,199.72	18,949.41	17,936.61	3,480,326.04	157,019.95	742,180.98	147,751.38	634,192.52	9,268.57	107,988.46
Secondary		6,874.31				6,874.31						
Total	19,136.33	3,506,149.76	1,199.72	18,949.41	17,936.61	3,487,200.35	157,019.95	742,180.98	147,751.38	634,192.52	9,268.57	107,988.46
Texas: Secondary	13,974.97	46,341.10			13,974.97	46,341.10						
Utah:												
Strawberry Valley	[1] 4,072.39	3,502,326.70	[1] 2,661.64	21,499.74	[1] 1,410.75	3,480,826.96	57,082.95	180,825.24	54,511.86	162,568.67	2,571.09	18,256.57
Secondary	15,999.26	86,415.61			15,999.26	86,415.61						
Total	11,926.87	3,588,742.31	[1] 2,661.64	21,499.74	14,588.51	3,567,242.57	57,082.95	180,825.24	54,511.86	162,568.67	2,571.09	18,256.57
Washington:												
Okanogan	132,650.49	1,290,454.30	1,393.86	56,017.45	131,256.63	1,234,436.85	136,889.18	303,651.71	59,312.82	217,930.11	77,576.36	85,721.60
Yakima	240,245.17	10,664,562.64	46,572.13	320,966.88	193,673.04	10,343,595.76	242,734.78	1,705,694.82	213,428.82	1,641,469.15	29,305.96	64,225.67
Secondary	4,815.10	167,176.41			4,815.10	167,176.41						
Total	377,710.76	12,122,193.35	47,965.99	376,984.33	329,744.77	11,745,209.02	379,623.96	2,009,346.53	272,741.64	1,859,399.26	106,882.32	149,947.27
Wyoming:												
Riverton												
Shoshone	504,279.06	6,766,859.07	6,280.43	49,876.90	497,998.63	6,716,982.17	107,278.66	456,122.39	101,881.66	422,593.20	5,397.00	33,529.19
Secondary	2,205.23	27,497.06			2,205.23	27,497.06						
Total	506,484.29	6,794,356.13	6,280.43	49,876.90	500,203.86	6,744,479.23	107,278.66	456,122.39	101,881.66	422,593.20	5,397.00	33,529.19
Miscellaneous:												
Secondary	790.28	92,557.14	155.57	933.39	634.71	91,623.75						
Drainage and cut over		100,534.50				100,534.50						
Total	6,202,017.11	140,199,968.44	500,029.95	9,508,777.46	5,701,987.16	130,691,190.98	2,508,733.77	12,104,015.67	2,151,469.41	9,819,775.67	357,264.36	2,284,240.00
Denver office	40,053.38	40,091.65	213.48	[1] 2,092.94	39,839.90	42,184.59						
Washington office	2,129.50	4,074.74	2,280.95	776.10	[1] 151.45	3,298.64						
Flathead Indian		[1] 85.96				[1] 85.96						
Total	42,182.88	44,080.43	2,494.43	[1] 1,316.84	39,688.45	45,397.27						
Unearned retirement fund		5,859.82				5,859.82						
Grand total	6,244,199.99	140,249,908.69	502,524.38	9,507,460.62	5,741,675.61	130,742,448.07	2,508,733.77	12,104,015.67	2,151,469.41	9,819,775.67	357,264.36	2,284,240.00

[1] Contra. [2] Excess.

TABLE No. 14.—*Consolidated statement of construction cost and revenue.*

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys	$266,033.67	$4,289,251.29
Storage	1,361,271.07	34,607,124.74
Pumping for irrigation	14,650.58	[1] 1,391,155.03
Canal system	1,667,832.47	[1] 49,115,622.25
Lateral system	893,442.35	21,668,315.14
Drainage system	1,036,788.51	[1] 7,195,201.07
Flood protection	12,213.95	2,961,630.15
Power system	169,735.80	5,905,297.32
Farm units	34,090.66	670,756.66
Permanent improvements	152,998.28	3,044,443.59
Telephone system	4,618.28	503,821.23
Operation and maintenance during construction	678,800.90	8,370,284.41
Operation and maintenance compounded with construction	[2] 3,673.85	288,391.71
Unadjusted clearing	[2] 86,785.56	42,996.21
Salt River accounts closed out but not charged to features	.....	145,677.64
Total	6,202,017.11	140,199,968.44
REVENUES.		
Rentals of buildings	107,332.43	384,809.18
Rentals of irrigation water	496,710.71	6,186,925.65
Contractors' freight refunds	211.90	241,421.68
Net power earnings (prior to public notice)	1,731.49	1,038,526.85
Other revenues unclassified	[2] 83,055.59	1,707,223.45
Doubtful accounts	12,570.12	9,474.60
Hospital operations	20,079.03	31,746.08
Railroad operations	[2] 4,300.27	199.42
Farming operations	2,639.99	[2] 19,977.96
Field cost adjustments	[2] 53,889.86	[2] 71,571.49
Total revenues	500,029.95	9,508,777.46
Net cost of construction	5,701,987.16	130,691,190.98

[1] See Table No. 15 for additional construction cost. [2] Contra.

TABLE No. 15.—*Consolidated statement of operating cost and revenue.*

Features.	Calendar year 1920.			
	Operation.	Maintenance.	Supplemental construction.	Total.
Storage	$93,554.06	$73,593.88	.....	$167,147.94
Pumping for irrigation	111,717.74	32,665.46	$68,315.40	212,698.60
Canal system	127,298.58	462,742.52	.....	590,041.10
Lateral system	298,610.11	954,145.26	.....	1,252,755.37
Drainage system	15,521.39	56,466.20	.....	71,987.59
Flood protection	.....	87,225.09	.....	87,225.09
Permanent improvements	.....	27,910.39	.....	27,910.39
Farming operations	.....	.....	.....	.....
Miscellaneous expense	49,754.71	61,056.35	.....	110,811.06
Unadjusted clearing	.....	1,825.25	.....	1,825.25
Total costs	696,456.59	1,757,630.40	68,315.40	2,522,402.39
Less unpaid operation and maintenance added to construction	.....	.....	.....	13,668.62
Balance	.....	.....	.....	2,508,733.77
REVENUES.				
Operation and maintenance repayments under contracts with water users:				
Charges due	.....	.....	.....	2,167,380.53
Advance payments	.....	.....	.....	1,634.90
Interest and penalties	.....	.....	.....	21,187.64
Rentals of irrigating water	.....	.....	.....	17,148.58
Rentals of lands and buildings	.....	.....	.....	[1] 48,732.81
Other revenues, unclassified	.....	.....	.....	36,988.39
Discounts	.....	.....	.....	[1] 38,937.29
Farming operations	.....	.....	.....	[1] 1,010.18
Forfeiture	.....	.....	.....	[1] 4,656.95
Hospital operations	.....	.....	.....	461.32
Doubtful accounts	.....	.....	.....	5.28
Total revenue	.....	.....	.....	2,151,469.41
Difference—deficit	.....	.....	.....	357,264.36

TABLE No. 15.—*Consolidated statement of operating cost and revenue*—Continued.

Features.	To Dec. 31, 1920.			
	Operation.	Maintenance.	Supplemental construction.	Total.
Storage	$548,277.59	$322,103.03	.....	$870,380.62
Pumping for irrigation	456,469.51	160,281.35	$68,315.40	685,066.26
Canal system	955,392.52	2,516,177.80	78,259.87	3,549,830.19
Lateral system	1,823,270.53	4,201,674.77	.....	6,024,945.30
Drainage system	43,154.80	180,812.91	246,343.17	470,310.88
Flood protection	.....	239,426.70	.....	239,426.70
Permanent improvements	.....	115,613.24	.....	115,613.24
Farming operations	199.29	15,973.52	.....	16,172.81
Miscellaneous expense	125,474.27	312,534.86	.....	438,009.13
Unadjusted clearing	.....	1,825.25	.....	1,825.25
Total cost	3,952,238.51	8,066,423.43	392,918.44	12,411,580.38
Less unpaid operation and maintenance added to construction	.....	.....	.....	307,564.71
Balance	.....	.....	.....	12,104,015.67
REVENUES.				
Operation and maintenance repayments under contracts with water users:				
Charges due	.....	.....	.....	9,186,105.05
Advance payments	.....	.....	.....	2,655.74
Interest and penalties	.....	.....	.....	93,922.99
Rentals of irrigating water	.....	.....	.....	573,053.51
Rentals of lands and buildings	.....	.....	.....	17,635.01
Other revenues, unclassified	.....	.....	.....	67,752.02
Discounts	.....	.....	.....	[1] 129,348.03
Farming operations	.....	.....	.....	2,312.18
Forfeiture	.....	.....	.....	616.88
Hospital operations	.....	.....	.....	5,522.38
Doubtful accounts	.....	.....	.....	[1] 452.06
Total revenue	.....	.....	.....	9,819,775.67
Difference—deficit	.....	.....	.....	2,284,240.00

[1] Contra.

TABLE No. 16.—*Statement showing by fiscal years cost of all operations by the Reclamation Service, including general expense, the cost of general expense and the ratio of general expense to all costs.*

Year.	Project costs (construction and operation and maintenance).		General expense.	Per cent.
	Reclamation.	Indian.		
1907 and prior	$22,243,605.12	.....	$1,762,585.75	7.92
1908	12,677,204.57	$12,395.69	792,970.33	6.25
1909	9,991,464.81	165,372.24	887,484.08	8.74
1910	11,127,996.45	382,547.44	873,496.00	7.59
1911	8,614,395.28	599,759.31	897,501.27	9.73
1912	10,065,083.97	581,828.25	892,565.41	8.38
1913	7,850,827.72	430,489.02	958,443.72	11.57
1914	11,214,403.46	513,457.80	1,002,333.39	8.54
1915	15,095,676.56	234,300.53	1,058,809.24	6.99
1916	8,044,891.80	319,871.32	1,077,485.42	12.88
1917	6,433,847.97	764,992.78	1,080,303.78	15.00
1918	7,184,359.11	896,432.54	1,024,052.94	12.66
1919	8,049,249.59	559,272.69	862,046.74	10.01
1920	6,136,029.62	703,400.14	886,990.13	12.95
1921	9,125,090.95	623,002.64	903,274.53	9.27
	[1] 153,854,126.98	6,787,122.39	14,960,342.73	9.31

[1] Includes operation and maintenance cost to June 30, 1921.

TABLE No. 17.—*Statement of collections to June 30, 1921.*

State and project.	Reclamation fund.							Yuma Auxiliary.		Special.	Increase of compensation.	Total.
	Construction.	Operation and maintenance.	Water rentals.	Power and light.	Indian.	Unclassified.	Total.	Construction.	Miscellaneous.			
Arizona:												
Salt River	$609,961.32		$2,246,726.01	$998,411.03		$878,227.92	$4,733,326.28					$4,733,326.28
Yuma	739,552.76	$550,494.05	447,616.69			467,307.95	2,204,971.45				$211.34	2,205,182.79
Yuma Auxiliary								$423,387.51	$393.12			424,080.63
California: Orland	129,657.66	125,187.84	119,925.00			30,323.47	405,093.97				.76	405,094.73
Colorado:												
Grand Valley			99,724.22			109,433.01	209,157.23				51.20	209,208.43
Uncompahgre			950,187.43			221,139.11	1,171,326.54				51.47	1,171,378.01
Idaho:												
Boise	876,484.34	749,060.00	694,264.29	96,417.61		558,846.18	2,975,072.42				15.97	2,975,088.39
King Hill			3,811.78			34,391.79	38,203.57				9.00	38,212.57
Minidoka	1,127,113.19	913,576.77	258,915.01	431,569.36		1,038,984.22	3,770,158.55				20.47	3,770,179.02
Kansas: Garden City	142.50	104.50				56,886.88	57,133.88					57,133.88
Montana:												
Huntley	340,662.28	263,545.27	4,607.81			56,816.87	665,632.23				9.05	665,641.28
Lower Yellowstone	41,942.58	36,896.00	118,799.14			69,127.30	266,765.02				35.41	266,800.43
Milk River			105,234.23			63,198.22	168,432.45				23.88	168,456.33
St. Mary Storage						96,942.37	96,942.37				.78	96,943.15
Sun River	167,645.49	107,740.29	6,803.86			93,435.52	375,625.16				5.65	375,630.81
Nebraska: North Platte	1,399,645.26	1,141,844.34	105,528.01	17,144.83		241,634.92	2,905,797.36				18.28	2,905,815.64
Nevada: Newlands	457,711.81	510,702.22	14,431.67	112,356.71		191,206.50	1,286,408.91				29.61	1,286,438.52
New Mexico:												
Carlsbad	282,286.56	293,862.52	17,384.74			54,223.62	647,757.44				48.47	647,805.91
Hondo			9,129.70			25,712.00	34,841.70					34,841.70
Rio Grande			1,055,222.00	2,243.33		527,092.89	1,584,558.22			[1] $91.78	36.40	1,584,686.40
North Dakota: North Dakota pumping	10,075.22	22,043.28	2,149.03	255,919.26		24,148.64	314,335.43				10.86	314,346.29
Oregon:												
Umatilla	329,007.03	196,885.24	27,584.22			139,183.15	692,659.64				1.67	692,661.31
Klamath	437,347.79	307,474.09	40,931.76	5,020.00		165,688.23	956,461.87				36.09	956,497.96
South Dakota: Belle Fourche	436,758.37	487,953.60	3,708.22			43,403.37	971,823.56				6.21	971,829.77
Utah: Strawberry Valley	251,827.84	141,381.32	8,388.39	78,251.59		317,396.52	797,445.66				14.46	797,460.12
Washington:												
Okanogan	35,401.88	121,024.76	105,449.89	1,754.71		17,264.48	280,895.72				15.43	280,911.15
Yakima	2,453,052.11	1,568,638.70	129,819.44	3,635.33		550,359.42	4,705,505.00				142.97	4,705,647.97
Wyoming:												
Riverton						17,021.93	17,021.93				1.50	17,023.43
Shoshone	550,974.31	341,975.29	9,445.79			190,532.14	1,092,927.53				6.60	1,092,934.13

Secondary:												
Miscellaneous						218,684.35	218,684.35					218,685.12
Imperial Valley						45,650.85	45,650.85				.77	45,650.85
Boulder Canyon						35,293.23	35,293.23					35,293.23
Denver office						96,604.50	96,604.50				3,367.93	99,972.43
Washington office						233,757.58	233,757.58				4,849.19	238,606.77
Indian projects:												
Blackfeet					$951,160.63		951,160.63					951,160.63
Flathead					1,581,295.96		1,581,295.96					1,581,295.96
Fort Peck					465,372.65		465,372.65					465,372.65
Drainage and cut over										464.51		464.51
	10,677,250.30	7,880,390.08	6,585,788.33	2,002,723.76	2,997,829.24	6,910,119.13	37,054,100.84	423,387.51	693.12	556.29	9,021.42	37,487,759.18
Items in transit							1,841.30				617.11	2,458.41
Grand total	10,677,250.30	7,880,390.08	6,585,788.33	2,002,723.76	2,997,829.24	6,910,119.13	[2] 37,055,942.14	[3] 423,387.51	[3] 693.12	[4] 556.29	[5] 9,638.53	[6] 37,490,217.59

[1] 34 Stat., 1357.
[2] Total as per Table No. 6.
[3] Total as per Table No. 8.
[4] Total as per Table No. 8.
[5] Total as per Table No. 7.
[6] Total as per Table No. 9.

TABLE No. 18.—*Status of construction and operation and maintenance repayments as of June 30, 1921.*

State and project.	Construction charges.					Operation and maintenance.					
	Debits.	Credits.			Balance uncollected.	Debits.	Credits.				Balance uncollected.
		Cash.	Other credits.	Total.			Cash.	Discount.	Other credits.	Total.	
Arizona: Salt River	$813,281.76	$609,961.32		$609,961.32	$203,320.44						
Arizona-California:											
Yuma	744,302.45	714,908.69		714,908.69	29,393.76	$528,519.46	$511,888.44	$6,136.14		$518,024.58	$110,494.88
Auxiliary	604,028.00	402,320.03		402,320.03	201,707.97						
California: Orland	124,230.26	124,230.26		124,230.26		131,661.92	125,156.85	6,505.07		131,661.92	
Idaho:											
Boise	928,552.40	851,779.59	$25,092.00	876,871.59	51,680.81	868,650.19	722,152.74	29,488.88		751,641.62	117,008.57
Minidoka	1,387,185.90	1,102,365.68	153,341.49	1,255,707.17	131,478.73	1,116,379.68	826,775.21	14,917.79	$50,294.97	891,987.97	224,391.71
Montana:											
Huntley	338,110.20	328,823.10		328,823.10	9,287.10	310,281.71	258,106.11	5,504.16	96.42	263,706.69	46,575.02
Lower Yellowstone	10,050.86	10,050.86		10,050.86		171,399.19	35,831.20	4.63		35,835.83	135,563.36
Sun River	137,046.90	129,921.25		129,921.25	7,125.65	122,776.75	106,370.90	2,430.99		108,801.89	13,974.86
Nebraska-Wyoming: North Platte	1,622,831.70	1,341,893.06	33,711.85	1,375,604.91	247,226.79	1,384,836.49	1,125,591.99	27,369.25	9,231.66	1,162,192.90	222,643.59
Nevada: Newlands	466,388.97	450,750.00	5,436.50	456,186.50	10,202.47	564,905.74	505,018.56	10,861.13	6,158.36	522,038.05	42,867.69
New Mexico: Carlsbad	307,995.52	272,175.37		272,175.37	35,820.15	336,119.84	286,709.33	4,356.24		291,065.57	45,054.27

TABLE No. 18.—*Status of construction and operation and maintenance repayments as of June 30, 1921*—Continued.

State and project	Construction charges					Operation and maintenance.					
	Debits.	Credits.			Balance uncollected.	Debits.	Credits.				Balance uncollected.
		Cash.	Other credits.	Total.			Cash.	Discount.	Other credits.	Total.	
North Dakota: North Dakota pumping	$26,396.37	$1,089.12	.....	$1,089.12	$25,307.25	$47,939.79	$21,783.58	.....	.....	$21,783.58	$26,156.21
Oregon: Umatilla	337,467.42	294,413.67	.....	294,413.67	43,053.75	243,465.42	189,242.51	$3,265.07	.....	192,507.58	50,957.84
Oregon-California: Klamath	473,019.66	433,598.76	.....	433,598.76	39,420.90	401,753.20	304,978.49	4,372.02	$6,705.07	316,055.58	85,697.62
South Dakota: Belle Fourche	500,092.73	421,794.63	.....	421,794.63	78,298.10	623,620.60	459,664.29	10,909.36	.....	470,573.65	153,046.95
Utah: Strawberry Valley	262,725.21	250,205.12	.....	250,205.12	12,520.09	153,301.42	140,573.80	5,518.70	.....	146,092.50	7,208.92
Washington:											
Okanogan	47,648.11	34,407.99	.....	34,407.99	13,240.12	158,194.82	118,890.24	356.03	1,984.93	121,231.20	36,963.62
Yakima	2,551,425.41	2,415,842.25	$26,446.87	2,442,289.12	109,136.29	1,661,148.01	1,545,885.85	19,706.36	1,045.34	1,566,637.55	94,510.46
Wyoming: Shoshone	585,788.37	542,041.59	.....	542,041.59	43,746.78	414,684.05	336,441.71	7,958.95	.....	344,400.66	70,283.39
Total	12,268,578.20	10,732,582.34	244,028.71	10,976,611.05	[1] 1,291,967.15	9,339,638.28	7,621,061.80	159,660.77	75,516.75	7,856,239.32	[2] 1,483,398.96

State and project.	Supplemental construction paid as operation and maintenance.			
	Debits.	Credits (cash).	Other credits.	Balance uncollected.
Idaho:				
Boise	$46,649.27	$19,667.44	$841.74	$26,140.09
Minidoka	78,986.14	78,096.73	249.17	640.24
Montana: Huntley	2,290.48	1,828.75	.....	461.73
New Mexico: Carlsbad	965.00	772.00	.....	193.00
Oregon-California: Klamath	1,528.81	684.39	.....	844.42
South Dakota: Belle Fourche	20,428.64	15,112.32	.....	5,316.32
Wyoming: Shoshone	700.94	700.94	.....	.....
Total	151,549.28	116,862.57	1,090.91	33,595.80

[1] Percentage of uncollected construction charges, 10.5.

[2] Percentage of uncollected operation and maintenance charges, 15.9.

TABLE NO. 19.—*Status of miscellaneous collection accounts June 20, 1921.*

State and project.	Rental of irrigation water.				Rentals power and light.			
	Debits.	Credits.		Balance uncollected.	Debits.	Credits.		Balance uncollected.
		Cash.	Other credits.			Cash.	Other credits.	
Arizona: Salt River	$2,246,726.01	$2,246,726.01			$998,411.03	$998,411.03		
Arizona-California: Yuma	450,961.84	447,616.69	$65.02	$3,280.13				
California: Orland	119,925.00	119,925.00						
Colorado:								
Grand Valley	109,937.78	99,724.22		10,213.56				
Uncompahgre	1,040,626.61	950,187.43		90,439.18				
Idaho:								
Boise	706,086.94	694,264.29	5,088.50	6,734.15	96,417.61	96,417.61		
King Hill	3,811.78	3,811.78						
Minidoka	262,257.38	258,915.01	3,234.23	108.14	463,825.96	431,569.36	$4,799.44	$27,457.16
Montana:								
Huntley	4,670.71	4,607.81		62.90				
Lower Yellowstone	121,910.92	118,799.14		3,111.78				
Milk River	136,537.97	105,234.23		31,303.74				
Sun River	12,785.41	6,803.86		5,981.55				
Nebraska-Wyoming: North Platte	108,273.21	105,528.01	2.00	2,743.20	27,266.27	17,144.83	7,873.97	2,247.47
Nevada: Newlands	14,668.17	14,431.67		236.50	139,189.03	112,356.71	25,487.75	1,344.57
New Mexico:								
Carlsbad	17,384.74	17,384.74						
Hondo	9,165.19	9,129.70		35.49				
New Mexico-Texas: Rio Grande	1,074,550.44	1,055,222.00		19,328.44	2,243.33	2,243.33		
North Dakota: North Dakota pumping	2,948.58	2,149.03	799.55		263,976.71	255,919.26	395.20	7,662.25
Oregon: Umatilla	28,112.04	27,664.22		447.82				
Oregon-California: Klamath	40,948.48	40,931.76		16.72	5,020.00	5,020.00		
South Dakota: Belle Fourche	3,858.22	3,708.22		150.00				
Utah: Strawberry Valley	8,388.39	8,388.39			81,051.90	78,251.59		2,800.31
Washington:								
Okanogan	109,565.87	105,449.89	2,273.24	1,842.74	1,754.71	1,754.71		
Yakima	131,318.78	129,819.44		1,499.34	3,635.33	3,635.33		
Wyoming: Shoshone	9,846.41	9,445.79		400.62				
Total	6,775,266.87	6,585,868.33	11,462.54	177,936.00	2,082,791.88	2,002,723.76	38,556.36	41,511.76

TABLE NO. 19.—*Status of miscellaneous collection accounts June 20, 1920*—Continued.

State and project.	Rentals grazing lands.			Freight refunds.			Miscellaneous.		
	Debits.	Credits (cash).	Balance uncollected.	Debits.	Credits (cash).	Balance uncollected.	Debits	Credits (cash).	Balance uncollected.
Arizona: Salt River	$19,373.14	$19,373.14	.....	$21,180.85	$21,180.85	.....	$1,273,131.79	$1,273,131.79	.....
Arizona-Nevada	.....	.....	.....	.....	.....	.....	103.20	103.20	.....
Arizona-California:									
Yuma	7,570.02	6,848.10	$721.92	18,685.46	18,505.86	$179.60	305,585.59	42,659.22	$262,926.37
Auxiliary	.....	.....	.....	6.32	.....	6.32	709.82	693.12	16.70
California: Orland	5,017.00	5,017.00	.....	1,841.50	1,832.02	9.48	4,520.88	4,461.18	59.70
Colorado:									
Grand Valley	184.00	122.00	62.00	8,118.15	8,098.02	20.13	6,953.39	6,795.09	158.30
Uncompahgre	.....	.....	.....	2,698.68	2,690.07	8.61	23,246.10	23,018.41	227.69
Idaho:									
Boise	20,862.18	20,675.13	187.05	13,470.24	13,405.54	64.70	562,041.12	556,342.08	5,699.04
King Hill	.....	.....	.....	557.78	510.28	47.50	6,644.02	4,353.61	2,290.41
Minidoka	31,632.62	27,793.16	3,839.46	1,108.36	1,089.33	19.03	40,383.46	39,461.95	921.51
Kansas: Garden City	.....	.....	.....	1,911.73	1,911.73	.....	6,822.58	6,822.58	.....
Montana:									
Huntley	10,470.77	8,762.88	1,707.89	7,636.73	7,633.45	3.28	8,213.91	8,142.47	71.44
Lower Yellowstone	2,469.63	2,444.63	25.00	21,261.33	21,261.33	.....	19,548.68	19,447.72	100.96
Milk River	19,022.43	15,893.15	3,129.28	18,810.86	18,676.40	134.46	4,846.88	4,843.13	3.75
St. Mary Storage	.....	.....	.....	6,839.03	6,672.68	166.35	22,496.85	20,298.16	2,198.69
Sun River	25,573.47	18,768.22	6,805.25	14,552.76	14,484.72	68.04	104,518.54	16,255.45	88,263.09
Nebraska-Wyoming: North Platte	61,079.17	58,044.67	3,034.50	37,055.55	36,953.04	102.51	131,740.28	128,287.40	3,452.88
Nevada: Newlands	23,678.79	23,630.39	48.40	962.82	918.55	44.27	31,908.96	29,568.23	2,340.73
New Mexico:									
Carlsbad	8,752.45	8,532.49	219.96	208.29	205.36	2.93	15,006.54	14,361.72	644.82
Hondo	.....	.....	.....	159.63	159.63	.....	435.90	435.90	.....
New Mexico-Texas: Rio Grande	1,118.05	1,057.55	60.50	7,090.94	6,964.75	126.19	22,236.38	17,299.10	4,937.28
North Dakota: North Dakota pumping	913.85	[1] 913.85	.....	5,495.08	5,495.08	.....	18,773.74	18,763.74	10.00
Oregon: Umatilla	702.05	627.05	75.00	1,055.31	1,055.31	.....	23,838.56	22,684.71	1,153.85
Oregon-California: Klamath	124,034.53	121,377.81	2,656.72	10,854.71	9,520.14	1,334.57	7,672.64	5,298.67	2,373.97
South Dakota: Belle Fourche	.....	.....	.....	2,901.11	2,880.32	20.79	15,831.47	15,632.08	199.39
Utah: Strawberry Valley	145,892.63	145,892.63	.....	692.63	691.61	1.02	706.87	.....	706.87
Washington:									
Okanogan	586.50	586.50	.....	.....	.....	.....	18,130.20	16,693.41	1,436.79
Yakima	19,034.24	18,141.06	893.18	16,343.72	16,310.81	32.91	223,490.36	221,117.76	2,372.60
Wyoming: Shoshone	7,172.32	6,899.13	273.19	19,666.30	19,666.30	.....	9,263.64	7,762.23	1,501.41
Secondary	138,531.05	118,789.83	19,741.22	466.70	466.70	.....	25,329.29	1.50	25,327.79
Total	673,670.89	[1] 630,190.37	43,480.52	241,632.57	239,239.88	2,392.69	2,934,131.64	2,524,735.61	409,396.03

[1] Includes other credits $18.

ACCOUNTING TERMINOLOGY.

Accounting.—The art or science of analyzing, classifying, recording, summarizing, and interpreting facts relating to the acquisition, production, transfer, and ownership of articles of wealth or value.

Accounts.—Systematic statements of financial facts of identical or opposite character, so arranged as to readily provide summaries or balances of the same.

Accruals of water-right charges.—The installments on account of construction or operation and maintenance charges which become due upon definite dates.

Advance payments of water-right charges.—The amounts paid by water users in excess of accruals.

Allotment.—As used in the Reclamation Service, an allotment is that part of an appropriation which is allotted by the Director to a project for expenditure.

Appropriation.—As used in Reclamation Service accounting, this represents the amount of money set aside by Congress from the reclamation fund to be used in the construction or operation and maintenance, or both, of a project.

Assets of a project.—The amount of money, or property expressed in terms of money, which the project owns or which is at its disposal.

Bookkeeping.—The mechanical operation of assembling financial data in books of record. (See *Accounts* and *Accounting.*)

Capital investment.—The group of accounts representing actual transactions in cash, or its equivalent. All money transactions and transactions in property and services expressed in terms of money will be finally recorded in this group. The total "disbursements" less the total "collections" is the "net investment."

Charges, water-right.—See *Construction* and *Operation and maintenance charge.*

Clearing accounts.—Accounts for handling operating expenses incidental to the work, which can not be charged with reasonable accuracy direct to feature costs, and which are "cleared" in some more or less arbitrary manner at the close of stated periods.

Collections.—Moneys, or the equivalent thereof, received by the Government in liquidation of a debt due or to become due.

Commercial paper.—As used in reclamation accounting, commercial paper is synonymous with personal checks, bank drafts, post-office money orders, and like documents which are convertible directly into cash or its equivalent.

Construction cost.—See *Cost.*

Construction water-right charge.—A charge assessed against the irrigable area to cover the cost of construction of the irrigation system.

Controlling accounts.—Accounts established in the general ledger in which are summarized the transactions recorded and carried in subsidiary or auxiliary records.

Cost.—The *gross cost* of construction of a project is the value of services performed or property used, either directly or indirectly, in connection with the construction of the irrigation and auxiliary works of the project. It does not include the value of materials purchased and still in stock, but does include services and materials used, even though still unpaid and carried as liabilities. The *net cost* of construction of a project is its gross cost less the value of all revenues the occurrence or accrual of which is incidental to the work during the period of construction.

Depreciation.—The reduction of the original cost or value, due to deterioration by wear and tear or otherwise, of a structure, facility, or unit of equipment.

Detail cost accounts.—Classes or divisions of expense making up the cost of a physical feature.

Disbursements.—See *Expenditure.*

Equipment.—Equipment, or nonexpendable property, is property which neither loses its identity, becomes a permanent fixture, nor is immediately consumed when applied to its intended use.

Estimate.—As used in the Reclamation Service, an estimate is an opinion or calculation obtained from the best information at hand of the cost of doing a stated work and of the quantities of the several units of work contained therein.

Expenditure.—The payment or disbursement of cash, or its equivalent, when such act operates to deprive the payor of further use or control of the article or property thus disbursed. In theory, when the construction of a project is completed, all liabilities and obligations liquidated, and all cash, equipment, materials, and other like assets expended in the work, then the "total expenditures" and the "gross construction cost" of the project will be equal.

Funds.—The amount of money available for expenditure for a specified purpose.

Gross costs.—See *Cost.*

Inventory.—An itemized account, catalogue, or schedule of equipment, materials, supplies, or other property which is on hand and available for use.

Investment.—See *Capital investment.*

Invoice.—The vendors' statement of goods sold, containing items, unit prices, and value of merchandise delivered or to be delivered. In reclamation accounting the term "invoice" must never be confused with "inventory."

Liabilities.—The amount of money, or of property or services expressed in terms of money, which the project owes, or is under obligation to pay, deliver, or render. (Repayment accounts are included in the project's liabilities for the reason that such accounts represent the amount of money which the project must return to the Government.)

Maintenance.—See *Operation and maintenance.*

Mercantile store.—The term used to designate buildings and contents where goods are kept for the purpose of sale, either for cash or coupons, or to be charged as deductions on pay rolls.

Mess house.—The term used to designate an eating place or dining room. It is improper to refer to such a place as a "commissary."

Nonexpendable property.—See *Equipment.*

Obligations.—See *Liabilities.*

Operation and maintenance.—"Operation" is the actual use of an irrigation system for the development and distribution of water, including works for drainage and flood protection, to preserve the irrigated lands against excess water. "Maintenance" embraces the repairs and renewals necessary to preserve the irrigation and drainage system in its original efficiency.

Operation and maintenance water-right charge.—An annual charge assessed against the irrigable area to cover the cost of the operation and maintenance of the irrigation system.

Operation and maintenance year.—The irrigation year, usually the calendar year Jan. 1 to Dec. 31, inclusive). On some southern projects the operation and maintenance year is arranged to accord with the irrigation season, but unless otherwise specified the term "Operation and maintenance year" is synonymous with calendar year.

Original entry.—The first record made of a charge or credit which becomes the basis of proof of the account.

Physical features.—The division of principal features for the purpose of collecting special costs on separate and distinct jobs or units or divisions of a project. They usually represent some tangible product when construction is completed, such as a canal, dam, bridge, etc.

Physical inventory.—The act of determining the quantity of equipment, materials, or supplies on hand by actual counting, weighing, or measuring each kind of property, and of making definite record thereof.

Plant or plants accounts.—As used in reclamation accounting these accounts are designed to receive all charges for the cost of original equipment and installation, with additions thereto, and also the cost of extraordinary repairs and of temporary plants erected to facilitate work on a project.

Posting.—The act of transferring amounts from a book or record of original entry to a ledger.

Principal features.—Represent a general division of the project into primary parts or units; the nature or function of each feature is usually implied by its name, such as examination and survey, storage works, canal system, etc.

Property, nonexpendable.—See *Equipment.*

Refund.—A reimbursement of an amount previously paid.

Register.—As used in reclamation accounting, this is a journal which, by special ruling, is designed to facilitate the recording of accounting transactions. It is usually, but not always, a book of original entry.

Reimbursable accounts.—Those kept to record the results of operations not directly related to cost-ledger features; the cost of their maintenance is reimbursed by cash receipts or deductions from service earnings.

Repair.—Replacement of some part of a structure, facility, or unit of equipment, made necessary through wear or other casualty, when such replacement does not amount to a substantial change of identity in such structure, facility, or unit of equipment.

Repayments.—Represent the sources from which the Government expects to secure reimbursement to the reclamation fund.

Replacement.—The substitution, as a whole, for a structure, facility, or equipment, worn out or become inadequate in service, such substitution having no greater capacity than the thing for which it was substituted.

Resources.—See *Assets.*

Revenues.—Revenues are incidental to the construction or operation and maintenance of a project, and the accruals thereof tend to decrease the gross costs of the construction or operation and maintenance of the project as a whole.

Storehouses.—As distinguished from mercantile stores, storehouses are the buildings, bins, chutes, or yards in which Government property is stored, available for assignment to the work, or transfer to other storehouses or projects.

Supplemental construction.—The improvements of an irrigation or drainage system, or any part or structure thereof, of a completed project, or of a completed portion of a project, as to which the construction charges have been announced.

Water-right charges.—See *Construction* and *Operation and maintenance charge.*

DISCUSSION OF PROJECTS.

PRIMARY PROJECTS.

(For detailed tables on cement, unit bids and contract prices, engineering data for projects on completion, crops, live stock, etc., see appendix.)

ARIZONA, SALT RIVER PROJECT.

C. C. Cragin, Salt River Valley Water Users' Association, general superintendent and chief engineer, Phoenix, Ariz.

The operation of the Salt River project was turned over to the water users on November 1, 1917. The Reclamation Service desires to express its appreciation of the cooperation of the Salt River Valley Water Users' Association in furnishing the following statement concerning the operations of the project during the fiscal year:

LOCATION.

Counties: Maricopa and Gila.

Townships: 2 S. to 3 N., Rs. 1 to 6 E. and 1 W., and Tps. 3 to 5 N., Rs. 11 to 14 E., Gila and Salt River base and meridian.

Railroads: Santa Fe, Prescott & Phoenix, Arizona Eastern.

Project cities and towns and estimated population June 30, 1921: Phoenix, 30,330; Mesa, 2,050; Glendale, 2,750; Tempe, 2,000; Chandler, 1,400; Peoria, 350; Gilbert, 870; Scottsdale, 50; Tolleson, 200; Higley, Lehi, Alhambra, Cashion, and Laveen, each about 25.

WATER SUPPLY.

Source of water supply: Salt and Verde Rivers and wells in various parts of the valley.

Area of drainage basins at Granite Reef Dam: Salt River, 6,250 square miles; Verde River, 6,000 square miles.

Annual run-off in acre-feet: Salt River at Roosevelt (5,760 square miles), 1889 to 1920, maximum 3,226,000, minimum 153,394, mean 882,237; Verde River at McDowell (6,000 square miles), 1889 to 1920, maximum 1,822,000, minimum 116,679, mean 591,077.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which works were prepared to supply water, season of 1920: 213,000 acres.

Area irrigated under rental contracts, season of 1920: 19,339 acres.

Area irrigated under public notice, season of 1920: 183,245 acres.

Length of irrigating season: 365 days, October 1 to September 30.

Rainfall on irrigable area: 35-year period, average, approximately 8.34 inches. Calendar year 1919, 9.32 inches.

Average elevation of irrigable area: 1,200 feet above sea level.

Range of temperature on irrigable area: 22° to 117° F.

Character of soil of irrigable area: Sandy loam, with clay in places.

Principal products: Alfalfa, grain, cotton, citrus and deciduous fruits, and live stock.

Principal markets: Phoenix and other Arizona towns, Pacific coast cities, and eastern markets.

LANDS OPENED FOR IRRIGATION.

Public notices: January 18, May 19, August 8, 1917, June 3, 1921.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun: 1902.

Construction recommended by the director: March 7, 1903.

Construction conditionally authorized by the Secretary: March 14, 1903.

Grand, Water Power, Salt River Valley, Maricopa, and Joint Head Canals purchased: June 15, 1906.
Intake Dam for Power Canal completed: October, 1906.
Power Canal completed: October, 1906.
Irrigation by the Reclamation Service begun: May 15, 1907.
Granite Reef Dam completed: August, 1908.
South Canal completed: June, 1909.
Eastern Canal completed: December, 1909.
Roosevelt Dam completed: February 5, 1911; formal dedication, March 18, 1911.
San Francisco pumping plant completed: October, 1911.
South-Consolidated power plant, operation commenced: October 23, 1912.
Arizona Falls power plant, operation commenced: May, 1913.
Western Canal completed and operation commenced: February 16, 1913.
Mesa District pumping plants (Batteries A, B, C, D, E, F), drilling commenced: December, 1908; final installation completed, June, 1913.
Highline pumping plant put in operation: June, 1913.
Highline Canal completed and operation commenced: June 16, 1913.
Raising of spillways, Roosevelt Dam, completed: August, 1913.
Joint Head Dam completed: March, 1914.
Reconstruction of the Arizona Canal completed: February, 1915.
McQueen pumping plant completed: March, 1915.
Farm unit survey completed: April, 1915.
Water over spillways of Roosevelt Reservoir: April 14, 1915; January–May, 1916.
Survey for silt deposit in Roosevelt Reservoir: June, 1915.
South Side Canal system completed: June, 1915.
Installation of sixth unit, Roosevelt power plant, completed: November, 1915.
Cross Cut power plant completed: December, 1915.
Project turned over to water users: November 1, 1917.
Project 100 per cent completed: June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Salt River project provides for the storage of water in the reservoir created by the building of the Roosevelt Dam, which is situated at the confluence of Tonto Creek and Salt River, about 70 miles northeast of Phoenix, Ariz. This stored water is carried down Salt River to a point about 4 miles below the mouth of the Verde River, where, together with such water as may be discharged by the Verde, it is diverted to the North and South side canal systems by the Granite Reef Diversion Dam. The water supply for the canals on the north side of the river is further augmented by the water diverted by the Joint Head Diversion Dam.

There have been completed and put into operation nine pumping plants with an approximate capacity each of 10 second-feet; 53 new pumping plants have been installed, having a discharge ranging from 1½ to 4 second-feet. A pumping plant located at the junction of the Western Canal and the Kyrene branch pumps water through a 54-inch pressure pipe 5,930 feet long to an elevation of 40 feet and waters approximately 7,500 acres of land. The United States claims all waste, seepage, unappropriated springs, and percolating water arising within the project, and proposes to use such water in connection therewith.

The canal and lateral system at present comprises 852.75 miles, and on completion of the project provides for the delivery of water to each 160-acre tract of irrigable land.

A power plant located at Roosevelt generates power from stored water in the reservoir and from water delivered from the Power Canal, heading at a diversion dam in Salt River, 19 miles above the storage dam. Four other power plants have been constructed by the water users' association and have become a part of the project, viz, the South-Consolidated, the Arizona Falls, the Cross Cut, and the Chandler. A portion of the power developed will be used for pumping water for irrigation and the remainder for industrial purposes.

The principal features are the Intake Dam and Power Canal, the Roosevelt Dam, Granite Reef Dam, Joint Head Dam, the main canals of the distributing system and the greater part of the lateral system, and the power system, comprising four power plants, transformer house, transmission lines, switching station, and four substations.

SUMMARY OF GENERAL DATA FOR SALT RIVER PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		213,000
Public land entered to end of fiscal year	16,170	
Private land	196,830	
Acreage service could have supplied season 1920		213,000
Acreage actually irrigated season 1920		205,060
Acreage cropped under irrigation season 1920		193,350
Crops:		
Value of irrigated crops season 1920		$18,551,818.50
Value of irrigated crops, per acre cropped		$95.95

CONSTRUCTION DURING FISCAL YEAR.

Roosevelt Dam, south spillway.—On October 1, 1920, a camp was established at Roosevelt and work started on the south spillway of the dam to repair the damage done by the flood of February, 1920. Two stiff-leg derricks were installed to handle the material. Excavations were made for a toe wall in material consisting mostly of loose rock of size varying from fine material to large bowlders. Practically all of this material was below the normal water level of the river. In order to do this work it was necessary to shut down the Roosevelt power plant from November 22 to December 10, to close all the outlets of the dam, and to unwater the excavations by means of pumps. The leakage from the reservoir was about 22 cubic feet per second. The pumping equipment consisted of three motor-driven pumps, one 12-inch centrifugal, one 10-inch centrifugal, and one 24-inch deep-well pump. The excavations were unwatered sufficiently so that the toe wall was built on bedrock entirely across the spillway. This toe wall was carried up above normal water level and then joined to the spillway floor with a pavement sloping at an angle of 45° to the horizontal. The portion of the south side wall of the spillway discharge that was damaged was repaired and the hole back filled. The portion of the fill that formed the north side wall of the spillway discharge that was not destroyed by the flood was faced all over with concrete and protected by a toe wall carried to the greatest depth possible. For excavations and back fill a total of 6,882 cubic yards of material was moved; 793 cubic yards of concrete were placed, in which were 35,143 pounds of reinforced steel. The work was completed during the early part of January, 1921.

Roosevelt power plant.—During the year, while making repairs to one of the generators of this plant, it was discovered that the armature slots were not entirely filled with the windings. After consultation with the manufacturers, new coils were bought and installed in the generators of units 1, 2, 3, 4, and 5, thus increasing the rated capacity of each unit from 1,060 to 1,350 kilovolt amperes. At a minimum of cost the capacity of the plant was increased 1,450 kilovolt amperes, this being possible because the water wheels were of sufficient capacity to carry the additional load at ordinary lake elevations without further changes. The rated capacity of the plant is now 11,570 kilovolt amperes.

A new Gibbs thrust bearing was installed in Unit No. 5 after the failure of the original roller type of thrust bearings. The change in bearings was caused mainly by the excessive cost of repair parts for the roller type of thrust bearing.

During the period of shutdown for repairs to the south spillway of the dam the opportunity was seized to make the following changes

in the draft-tube tunnel of Unit No. 3: The leakage discharge from the old cave was carried through a pipe to the tunnel portal, and the discharge from the two Pelton water wheels which drive the Lombard oil pumps was carried to the tunnel portal in a separate pipe; the discharge from the draft tubes of the two station exciter units was carried separately to the tunnel portal in a 30-inch pipe; these pipes were all concreted in and entirely separated from the discharge of Unit No. 3 draft tube. The trouble with this unit was overcome entirely by these changes.

Pumping plants.—For the purpose of drainage, 15 additional pumping plants were installed during this year. Layne and Bowler deep-well pumps direct-connected to electric motors were installed, the plants being very similar to the plants previously installed for a similar purpose. For supplying power to these plants 11½ miles of 11,000-volt wood-pole transmission line were constructed. Each plant is equipped with an outdoor type transformer station consisting of transformers, oil switch, lightning arresters, and disconnecting device. The construction of the plants was completed in June, 1921.

The Highline pumping plant was changed to meet the increased requirements for water for the district thus served. The pump shells of three pumps were bored out and larger runners installed, increasing the capacity of each from 9,000 to 12,500 gallons per minute. New 250-horsepower motors were installed on each of these pumps and a new 300-kilovolt ampere transformer was added to the plant. The surge chamber was raised 8 feet, and three 24-inch vent pipes were installed at intervals along the pipe line. The capacity of the plant was increased from a variable supply of 50 to 70 second-feet to a constant supply of 100 second-feet, and the plant has been in successful operation since April, 1921. The maximum requirements for water have been successfully met with the new equipment.

Telephone lines.—The traffic over the existing telephone line between Mesa and Phoenix became so congested that another line was imperative. The construction of a new wood-pole line between Phoenix and the Mesa switching station was commenced in August, 1920, and completed in November. A branch line was extended to the Highline pumping plant.

Substations.—To relieve an acute shortage of 60-cycle power in the Mesa district a temporary frequency changer station was built for the town of Mesa at the Chandler power plant. A 25-cycle 550-horsepower synchronous motor was obtained and belted to the old 60-cycle generator of the old abandoned steam plant. The unit operated successfully during the period of power shortage.

OPERATION AND MAINTENANCE OF POWER SYSTEM.

During most of the year the output of the power system was limited, owing to the inability of the Inspiration Consolidated Copper Co. to use all the hydroelectric power that was available for them. Owing to the low lake level and the lack of rain and snow on the Salt River watershed, the power output depended entirely throughout the year on the demand for irrigation water. During the winter months the power output was at a minimum.

During a 17-day period in November and December, when repairs were being made to the south spillway of the Roosevelt Dam, the

Roosevelt plant was shut down completely and the valley plants were without water most of the time. During this shutdown period power to supply those customers whose requirements had to be filled was obtained from the Inspiration Consolidated Copper Co.'s steam power plant at Miami, the generators at the Cross Cut plant being used as synchronous condensers to control the voltage as the load was concentrated about 120 miles from the source of power.

On April 1, 1921, the Inspiration Consolidated Copper Co. and the Magma Copper Co. discontinued production of copper, and consequently their power demand practically ceased. During April and May the power load was about 50 per cent of the system capacity. On June 1 the load of the Miami Copper Co. was obtained, and thereafter the plants were loaded to capacity.

The capacity of the Roosevelt plant decreased during June, owing to the falling lake level, and on June 30 the maximum capacity of the water wheels was 9,200 kilowatts, the lake elevation being 167.97 feet.

The valley power plants operated during the year according to the flow of water in the canals. No unusual difficulties developed at these plants. The Arizona Falls plant was shut down and the operating force transferred to other plants for a considerable period, owing to lack of water in the canal and later to lack of demand for power.

In August, 1920, a mile of the 45,000-volt transmission line in the mountain section near Fish Creek blew down during a windstorm. A temporary wood-pole line was constructed to by-pass the damaged section.

The pumping plants of the project were operated as required for irrigation and drainage.

SEEPAGE AND DRAINAGE.

Surveys and investigations as to the depth to ground water over the entire project and the effect of the operation of the pumping plants upon the water table in some of the more badly seeped areas were carried on during the entire year. The results show that the average water table over the project remained at the same elevation.

The beneficial effect for drainage of the operation of 38 pumping plants which were installed during 1919 for the development of additional water supply and for drainage is marked, particularly in the following areas: In the Grand Canal area of approximately 3,000 acres north of Phoenix the water table has lowered 3.2 feet from October, 1918, to October, 1920. In the Southside area of approximately 11,000 acres south of Mesa the water table has lowered 2.9 feet during the same period. Previous to the operation of the pumping plants the water table over these areas was rising at the rate of 1.5 feet per year.

Construction of drainage works was carried on as recommended by D. W. Murphy in report under date of February 14, 1920. Ten pumping plants were put in the Arizona and Grand Canal areas north of Phoenix, 1 in the New River area, and 4 in the area west of Chandler. Two closed tile drains were also completed—the old Cross Cut Drain, 1.04 miles long, and the Laveen Drain, 3.45 miles long.

OPERATION AND MAINTENANCE.

Operation was carried on with only slight interruption during the year. The past 12 months have been the driest in the history of the local weather bureau, the rainfall being only 2.05 inches, which is 25 per cent of normal. Owing to the drought the winter run-off was very light and the reservoir was steadily decreasing. The demand for water was very heavy during the latter part of 1920, but was considerably lighter during 1921.

A Monighan 2-yard walking-type drag-line excavator operated by gas engine was purchased during June, 1920, and put to work widening the Eastern Canal, in which work it was employed at the end of the fiscal year.

In March the association rebuilt the old Lidgerwood 1½-yard drag-line excavator, and it too was employed in widening the Eastern Canal.

The Ruth excavator, with modifications and improvements applied by the association, was employed almost constantly in berming the Western and Highline Canals, in which work it was giving increasingly satisfactory service owing to the improvements mentioned.

A wooden V, iron shod, equipped with steel cutting blades and drawn by 8 to 12 head of stock, was used with considerable success in demossing the main canals.

The canal system was extended by approximately 3½ miles of new laterals, making a total of 852¾ miles of canals and laterals.

The Roosevelt Reservoir conditions for the year beginning October 1, 1919, and ending October 1, 1920, are summarized as follows:

Date.	Elevation of water service.	Contents.
	Feet.	*Acre-feet.*
Oct. 1, 1919	169.67	594,476
Oct. 1, 1920	200.32	983,433
Gain over 1919	30.65	388,957

Historical review, Salt River project, by calendar years.

Item.	1920
Acreage for which works were prepared to supply water	[1] 213,000
Acreage irrigated	[1] 205,000
Miles of canals operated	852.75
Water diverted (acre-feet), 1920	[2] 1,371,983
Water delivered to land (acre-feet), 1920	594,615
Acre-feet per acre for area under cultivation, 1920	2.90

[1] Season of 1920–21.
[2] Includes 307,455 acre-feet wasted; water for salt River Valley Water Users' system only; outside water deducted.

Settlement data, Salt River project, by calendar years.

Item.	1920
Total number of farms on project (when completed)	[1] 4,700
Number of farms reported	[1] 4,200
Population	[2] 31,600
Number of towns	14
Population	39,795
Total population of towns and farms	71,395
Number of public schools	[1] 57
Number of churches	62
Number of banks	20
Total capital stock of banks	$1,752,500.00
Amount of deposits	$24,426,056.95
Number of depositors	[1] 35,000

[1] Estimated.
[2] Includes population within town-site areas.

Crop report, Salt River project, Arizona, for year ending Sept. 30, 1920.

[Data furnished by Salt River Valley Water Users' Association.]

Crop.	Acreage.	Yield.			Value.		
		Unit.	Average per acre.	Total.	Per unit.	Total.	Per acre.
Alfalfa	25,230	Ton	4	[1] 100,936	$18.00	$1,816,850	$72.00
Barley	4,463	Cwt	18	80,334	2.75	220,920	49.50
Beans	94	Pound	950	89,300	.07	6,250	66.50
Berries	107					49,220	460.00
Cantaloupes	2,557	Crate	190	485,830	1.10	534,410	209.00
Cotton seed	142,320	Pound	600	85,395,000	.0075	640,460	4.50
Cotton lint			200	28,465,000	.4325	12,311,100	86.50
Fruit, citrus	1,689	do	7,000	11,823,000	.05½	650,270	385.00
Fruit, deciduous	1,398	do	10,000	13,980,000	.03½	489,300	350.00
Garden truck	936					234,000	250.00
Lettuce	503	Crate	275	138,325	2.50	345,810	687.50
Grain, sorghum	5,597	Cwt	20	111,940	2.50	279,850	50.00
Corn	2,084	Pound	1,800	3,751,200	.03	112,540	54.00
Oats	1,135	Cwt	19	21,565	3.00	64,690	57.00
Pasture	8,732					261,960	30.00
Potatoes	195	Pound	3,600	702,000	.014	9,830	50.40
Vineyard	264	do	7,000	1,848,000	.07	129,360	490.00
Watermelons	385	Cwt	160	61,600	1.10	67,760	176.00
Wheat	3,363	do	17	57,171	4.00	228,680	68.00
Asparagus	3	Pound				3,300	1,100.00
Sudan grass	1,245	Ton	6	7,470	12.75	95,240	76.50
Total acreage cropped (not including town-site areas).	202,300	Total and average				18,551,800	96.00
Less acreage cropped twice	8,950						
Net acreage cropped	193,350						
Plus vacant land, including roadways, ditches, etc	5,536						
Plus home tracts, including house lots, corrals, etc	3,032						
Total acreage reported, less duplicated area	201,918						
Plus town-site acreage on which no crop was reported	3,142						
Total acreage receiving water service from project	205,060						

[1] Field.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, JUNE 3, 1921.

1. In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), and agreeable to the resolution of the board of governors of the Salt River Valley Water Users' Association adopted the 1st day of December, 1919, public notice for the Second Division of the Salt River project, Arizona, is hereby issued as follows:

2. **Lands for which water will be furnished.**—Upon proper application being made therefor, water will be furnished under said project in the irrigation season of 1920, beginning October 1, and thereafter for the lands of the Second Division, as shown upon plats of the following townships of the Gila and Salt River base and meridian, to wit:

T. 1 N., R. 1 W.	T. 3 N., R. 2 E.	T. 1 S., R. 5 E.
T. 2 N., R. 1 W.	T. 1 S., R. 3 E.	T. 2 S., R. 5 E.
T. 1 N., R. 1 E.	T. 1 N., R. 3 E.	T. 1 N., R. 5 E.
T. 2 N., R. 1 E.	T. 2 N., R. 3 E.	T. 1 S., R. 6 E.
T. 3 N., R. 1 E.	T. 3 N., R. 3 E.	T. 2 S., R. 6 E.
T. 1 S., R. 2 E.	T. 1 S., R. 4 E.	T. 1 N., R. 6 E.
T. 1 N., R. 2 E.	T. 1 N., R. 4 E.	T. 2 N., R. 6 E.
T. 2 N., R. 2 E.	T. 2 N., R. 4 E.	

which plats were approved on the date of this notice and are now on file in the office of the Salt River Valley Water Users' Association, Phoenix, Ariz., and the local land office at the same place.

3. **Prior public notices applicable.**—The irrigable areas of the Second Division shown on the plats above described are hereby made subject to all the terms and conditions of the public notices heretofore issued for this project, except that the date of application of such terms and conditions shall be the date of this public notice: *Provided*, That in so far as said public notices have been modified, changed, or supplemented by the terms, conditions, and provisions of the contract of September 6, 1917, between the United States and the Salt River Valley Water Users' Association, this notice shall be subject to the terms, conditions, and provisions of said contract.

4. **Limit of area for which water right may be secured.**—The limit of area of public land per entry, representing the acreage which, in the opinion of the Secretary of the Interior, may reasonably be required for the support of a family upon such land, is fixed at the amount shown upon the plats of the several farm units. For homestead entries subdivided into more than one farm unit, water-right applications will be received covering all units within such entries, but the acceptance of such applications will be subject to conformation of the entry to one farm unit within the period of two years specified in section 13 of said extension act. The maximum limit of area for which water-right application may be made for land in private ownership shall be 160 acres of irrigable land for each land owner. In case of ownership of both patented and unpatented land, water-right application will not be accepted for both unless all water-right charges on one of the tracts have been paid in full. All water-right applications must be filed in the office of the Salt River Valley Water Users' Association, Phoenix, Ariz.

5. **No public lands opened to entry.**—The areas of the Second Division shown on the plats referred to above do not include any unentered public lands.

6. **Nature of water rights.**—The water rights to be furnished the lands of the Second Division shall be of the same right and priority as those furnished by the United States under said public notices heretofore issued for the other lands of the project, and in case of any shortage of water supply the total amount available shall be prorated over all of the lands of the project.

7. **Application of moneys.**—The moneys received from the sale of water rights for lands of the Second Division shall be retained by said association and utilized by it for general project purposes, and the pecuniary obligation of the association to the United States shall in no manner be increased by reason of such income.

E. C. FINNEY,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Salt River project, June 30, 1921.

[From Washington office books.]

DEBITS.

Current accounts receivable		$203,320.44
Construction charges not due		9,352,740.21
Construction cost of works	$12,744,222.59	
Operation and maintenance during construction	2,362,719.51	
Gross construction cost	15,106,942.10	
Less revenues and cost adjustments during construction period	4,558,822.82	
Net construction cost		10,548,119.28
Total debits		20,104,179.93

CREDITS.

Resources for repaying cost of project		10,166,021.97
Investment:		
Disbursements and transfers from other projects	$14,738,768.28	
Less collections and transfers to other projects	4,800,610.32	
Net investment		9,938,157.96
Total credits		20,104,179.93

Construction cost and revenue, Salt River project, June 30, 1921.

[From Washington office books.]

Features:	To June 30, 1921.
Examination and surveys	$83,939.83
Storage	4,091,952.25
Pumping for irrigation	167,306.38
Canal system	2,815,053.02
Lateral system	620,071.25
Drainage investigation	7,673.05
Power system	3,948,066.34
Farm units	31,062.53
Permanent improvements	763,686.17
Telephone system	69,734.13
Operation and maintenance during construction	2,362,719.51
Accounts closed out but not charged to features	145,677.64
Gross construction cost	15,106,942.10
Less revenues earned during construction period:	
Rentals of buildings	20,575.22
Rentals of irrigation water	2,224,551.12
Contractors' freight refunds	21,180.85
Net power earnings	998,411.03
Other revenues unclassified	1,294,104.60
Total revenues	4,558,822.82
Net cost of construction	10,548,119.28

Statement of the financial condition of the Salt River Valley Water Users' Association as of June 30, 1921.

[From association's books.]

ASSETS.

Treasurer's cash		$4,033.28		
Valley Bank, Treasurer's accounts	$164,503.63			
Phoenix Savings Bank & Trust Co., Treasurer's account	625.86			
National Bank of Arizona, treasurer's account	[1] 3,278.50			
Treasurer's cash on deposit		161,850.99		
Valley Bank, paymaster	41,533.45			
Phoenix National Bank, paymaster account	437.63			
Total paymaster cash		41,971.08		
Imprest cash		200.00		
Total cash			$208,055.35	
Accounts receivable, members		158,617.77		
Accounts receivable		42,888.04		
Accounts receivable, miscellaneous		174,714.45		
Accounts receivable, employees		115.58		
Notes receivable		4,200.00		
Total accounts and notes receivable			380,535.84	
Total current assets				$588,591.19
Phoenix storehouse		96,908.73		
Mesa storehouse		58,342.37		
Roosevelt storehouse		1,204.29		
Garage storehouse		1,974.33		
Goods issued, not used		22,792.94		
Inventory adjustment account		[1] 8,323.16		
Goods in transit		10,717.15		
Freight and handling (undistributed)		19.35		
Total inventory accounts				183,636.00
Gross construction cost		12,302,435.34		
Subsequent construction cost		1,473,370.35		
New equipment		15,711.79		
Idle equipment		73.47		
Equipment in use		146,455.30		
Live stock		5,570.65		
Furniture and fixtures		19,694.68		
Total invested assets				13,963,311.58
Value of construction water-right contracts unaccrued				10,339,921.95
Total assets				25,075,460.72

LIABILITIES.

Unpaid labor		$25,994.02		
Accounts payable		139,514.12		
Vouchers payable		58,041.81		
Advance payments, power district contracts		523.61		
Unclaimed wages		2,075.25		
Advance payments, construction contracts		4,776.17		
Advance payments, recording fees		224.30		
Total current liabilities				$231,149.28
Unpaid to United States				9,556,060.65
Construction water-right charges held in trust		40,204.92		
Other trust funds		80,594.06		
Total trust liabilities				120,798.98
Unapplied operation and maintenace assessments		544,131.69		
Unapplied drainage assessment		[1] 26,802.62		
Unapplied waste ditch assessment		84,742.98		
Unapplied assessment, widening Eastern Canal		32,187.72		
Total unapplied assessment, current year			$634,259.77	
Unapplied assessment for construction 1918-19			33,836.39	
Unadjusted assessments			3,637.92	
Total unapplied assessments				671,734.08
Reserve for repayment to United States			207,529.77	
Reserve for emergencies			88,000.00	
Reserve for depreciation			2,143.06	
Reserve for liability insurance			[1] 215.25	
Total reserves				297,457.58
Hospital fund				[1] 1,651.33

[1] Contra entry.

Value of construction, water-right contracts	$10,949,883.27	
Investment of the association	3,012,408.92	
Unallotted surplus	191,298.02	
Total capital and surplus		$14,153,590.21
Earnings from operating account		46,321.27
Total liabilities		25,075,460.72

Operating statement of the Salt River Valley Water Users' Association as of June 30, 1921.

[From association's books.]

COSTS.

Operation and maintenance, Irrigation Division	$328,724.33		
Operation and maintenance, Town-site Division	2,887.97		
Operation and maintenance, Pumping Division	7,567.63		
Operation and maintenance, Power Division	152,662.42		
Operation and maintenance, ice machine	24.58		
Total operation and maintenance charges		$491,866.93	
Association ranch	284.75		
Interest paid	2,528.32		
Loss on mess houses	14.20		
Loss on ice machine	193.24		
Sundry losses	9,479.13		
Unadjusted clearing account	2,866.65		
Total miscellaneous charges		15,366.29	
Total operating costs			$507,233.22
Earnings over cost			46,321.27
			553,554.49

REVENUES AND APPLIED ASSESSMENTS.

Distributed accounts	$43.25	
Applied operation and maintenance assessments	22,838.93	
Sale of commercial power	382,872.62	
Water rentals	130,941.44	
Rental of land	65.00	
Rental of buildings	4,719.36	
Delinquent penalties	4,219.17	
Cash discounts	503.92	
Miscellaneous income	7,350.80	
Total revenues and applied assessments		$553,554.49

ARIZONA-CALIFORNIA, YUMA PROJECT.

PORTER J. PRESTON, project manager, Yuma, Ariz.

LOCATION.

Counties: Yuma, Ariz.; Imperial, Calif.

Townships: 8 to 11 S., Rs. 22 to 25 W., Gila and Salt River meridian; 15 and 16 S., Rs. 21 to 23 E., San Bernardino meridian.

Railroads: Southern Pacific; Yuma Valley Railroad; San Diego and Arizona.

Project cities and towns and estimated population June 30, 1921: Yuma, 5,700; Somerton, 1,200; Gadsden, Ariz., 150; Bard, 10; Potholes, 25; Winterhaven, Calif., 25.

WATER SUPPLY.

Source of water supply: Colorado River.

Area of drainage basin, 167,000 square miles above Laguna Dam.

Annual run-off in acre-feet of Colorado River at Yuma (225,000 square miles), 1902 to 1920: Maximum, 26,000,000; minimum, 7,960,200; mean, 16,900,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1921, 65,000 acres.

Length of irrigating season: 365 days.

Elevation of irrigable area: 80 to 140 feet above sea level.

Rainfall on irrigable area: Forty-year average, 3.1 inches; 1920, 4.75 inches.

Highest temperature, 29-year average, 115 degrees; lowest temperature, 29-year average, 28 degrees.

Character of soil of irrigable area: Bottom lands, rich alluvium.

Principal products: Egyptian and upland cotton, alfalfa, and grain.

Principal markets: Los Angeles and San Francisco, Calif.; Arizona towns.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: January 12, 1910; March 8, 1912; March 6, June 23, 1913; September 24, 1914; March 20, March 26, 1915; March 16, April 7, 1916; April 6, 1917; March 9, May 7, July 16, 1918; March 24, May 3, June 14, July 1, 1919; February 6, November 23, 1920 (order).

Location of lands opened: T. 15 S., R. 23 E.; T. 16 S., Rs. 22 and 23 E.; San Bernardino meridian; T. 8 S., Rs. 23 and 24 W.; T. 9 S., Rs. 23 and 24 W.; T. 10 S., Rs. 23, 24, and 25 W.; T. 11 S., Rs. 24 and 25 W.; Gila and Salt River base and meridian.

Limit of area of farm units: Public, 40 acres.

Duty of water: 3 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $55, $66, $75, $77, and $90 for gravity lands.

Annual operation and maintenance charge: $3.50 per acre minimum for 2 acre-feet per acre, and $2 per acre-foot for water in excess of this.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.

Construction recommended by board of engineers April 8, 1904.

Construction authorized by Secretary May 10, 1904.

Canal system of Colorado Valley Pumping & Irrigating Co. purchased March 15, 1907.

First irrigation by Reclamation Service, season of 1907.

Canal system of Yuma Valley Union Land & Water Co. (Farmers' Gravity Canal), purchased February 3, 1908.

Rollins ditch (including Ives heading pumps and ditches) purchased July 23, 1908.

Laguna Dam completed March, 1909.

Colorado River siphon completed June 29, 1912.

Gravity water from Laguna Dam furnished to Yuma Valley through siphon June 29, 1912.

Yuma Valley Railroad constructed June, 1914.

Yuma project 95 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Yuma project provides for the diversion of water from the Colorado River at the Laguna Dam, 10 miles northeast of Yuma, Ariz., into a canal system heading on the California side, conveying water to the irrigable lands on that side of the river, including those in the Yuma Indian Reservation, crossing the river at Yuma through an inverted siphon and serving lands in the Yuma Valley below the town of Yuma. The plan also provides for large pumping plants below Yuma, on the east main canal, for raising water to irrigate 40,000 acres of mesa land. The lands adjacent to the Colorado River are protected from overflow by means of levees. In addition, a drainage system is under construction and is being extended to areas in which the ground water is rising to such an extent as to threaten the lands with seepage. At the lower end of the project a large pumping plant is provided for pumping the drainage waters across the levee.

The United States claims all waste, seepage, unappropriated spring and percolating water arising within the project and proposes to use such water in connection therewith. The Laguna Dam, 360 miles of canals and laterals, including 39.8 miles of tile drains and drainage ditches, the Colorado River Siphon, 930 feet in length and 14 feet in diameter, and the levee system are completed.

SUMMARY OF GENERAL DATA FOR YUMA PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		65,000
Public land entered to June 30, 1921	12,270	
Public land withdrawn on June 30, 1921	1,400	
Indian land June 30, 1921	8,200	
Private land June 30, 1921	43,130	
Acreage Service could have supplied in season of 1920		65,000
Estimated acreage Service can supply in season 1921		65,000
Estimated acreage Service can supply in season 1922		65,000
Acreage irrigated season of 1920		54,550
Acreage cropped under irrigation season of 1920		54,480
Crops:		
Value of irrigated crops season of 1920		$3,328,500
Value of irrigated crops per acre cropped		61.09
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$435,000.00	
Miscellaneous collections and transfers issued	136,388.82	
Increase of compensation	34,714.41	
Total amount authorized		606,103.23
Encumbrances—		
Disbursements and transfers received	360,400.41	
Current liabilities	42,520.65	
Contingent liabilities	2,300.50	
Increase of compensation	35,088.30	
Total encumbrances		440,309.86
Unencumbered balance on July 1, 1921		165,793.37
Fiscal year 1922—		
Amount specified in appropriation act		415,000.00
Fiscal year 1923—		
Proposed appropriation		550,000.00
Inventories:		
Value of stock on hand		62,016.63
Value of plant and equipment in use		179,810.80
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$9,543,777.23	
Less revenues and adjustments	405,052.50	
Net cost to June 30, 1921		9,138,724.73
Per cent completed on June 30, 1921	95	
Estimated per cent completed on June 30, 1922	96	
Estimated per cent completed on June 30, 1923	97	
Value of construction water-right contracts and other resources to repay net cost of project		5,875,035.02
Revenues held in reserve		28,895.01
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$1,048,701.01	
Less charges due and miscellaneous revenues	733,523.79	
Deficit		315,177.22

Drainage:		
Total cost of drainage works to June 30, 1921		$525,217.84
Miles of drains built to June 30, 1921—		
Open	$35.8	
Closed	4.0	
Total		39.8
Estimated acreage damaged by seepage on June 30, 1921		2,600
Estimated acreage protected by drains to June 30, 1921		33,000
Estimated acreage to be protected by authorized system		38,000

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges	$744,302.45	$714,908.69	.....	.....	$714,908.69	$29,393.76
Operation and maintenance charges (public notice)	628,519.46	511,888.44	$6,136.14	.....	518,024.58	110,494.88
Rentals, irrigation water	450,961.84	447,616.69	.....	$65.02	447,681.71	3,280.13
Rentals, grazing and farming lands	7,570.02	6,848.10	.....	.....	6,848.10	721.92
Contractors' freight refunds	18,685.46	18,505.86	.....	.....	18,505.86	179.60
Miscellaneous	305,585.59	42,659.22	.....	.....	42,659.22	262,926.37
Total	2,155,624.82	1,742,427.00	6,136.14	65.02	1,748,628.16	406,996.66

CONSTRUCTION DURING FISCAL YEAR.

Examinations and surveys.—The measurements of the Colorado River were continued at Yuma and the gaging station at Topoc was maintained in connection with the United States Geological Survey. The spring flood of 1921 reached the peak on June 28, with a gage height of 31.2 feet and a measured discharge of 186,000 second-feet. This is the greatest actual gaging ever obtained at Yuma and the highest point on record reached by the Colorado River flood (Gila River excluded) since the gage was established in 1878.

Lateral system.—Some small timber turnouts and checks were built to serve land put under irrigation for the first time.

Drainage system.—The Bucyrus 2-yard drag line was operated one shift throughout the year on the East and East Central Drains; 3.5 miles of drain, 3 timber bridges, 3 metal flumes, and 1 timber culvert were built and 216,000 cubic yards of earth excavated. On March 14, work was started on the South Drain with a 1-yard Monighan drag line working two shifts until April 19 and three shifts from that date to June 21, when operations were suspended on account of soft ground caused by seepage from the river. A surface drain 950 feet long between the South Drain and the West Main Canal, was excavated during May by the P. & H. 206 drag line. In connection with this work, 3 timber bridges, 3 metal flumes, and 4 small timber structures were built and 93,000 cubic yards of earth excavated. Two and one-half miles of this drain were partially completed. During April and May, the P. & H. 206 drag line connected seven-eighths mile of slough at the upper end of the Main Drain. Four timber bridges across the Main Drain were built during the year.

Permanent improvements.—Two cottages were erected at Yuma for headquarters employees. One ditch rider's cottage was completed on the Yuma Valley Division and a contract entered into for four more, three on the Reservation Division and one in the Yuma

Valley Division, the material to be furnished by the United States. It is expected that the cost of these buildings will be returned by collection of rentals.

SEEPAGE AND DRAINAGE.

Owing to high flood stage of the river, seepage along the levee in the lower part of the valley was very pronounced. The construction of the South Drain relieved this condition to a large extent and since, in anticipation of this condition, the land along the levee, for the most part, has never been placed under public notice, little damage resulted. In the Reservation Division, conditions were noticeably improved owing to lower water on account of the cut-off in the river during June, 1920. The maximum elevation of the water surface below the dam was 5 feet lower than during the 1920 spring flood, although the gage at Yuma was 0.9 foot higher.

BOARD REPORTS.

Date.	Subject.	Personnel.
Feb. 21, 1921.....	Report of San Carlos project board and of the engineer.	F. W. Hanna, James Munn, and C. C. Fisher.

OPERATION AND MAINTENANCE.

Water was delivered on a weekly rotation on request schedule during the summer months and on a fortnightly schedule during the winter, the customary irrigation head being 12 second-feet. Two Monighan drag lines cleaned 12.3 miles of main canals, excavating 125,000 cubic yards of silt. The V machine cleaned 23.5 miles of lateral; work with this machine was suspended August 14, as this type of machine is now uneconomical. During June the P. & H. 206 drag line cleaned 1.75 miles of the Main Drain west of Somerton.

The Ruth dredger, purchased during the fiscal year 1920, continued work and three new machines were bought; these four machines cleaned 151.7 miles of laterals, an average of 5 miles per machine per month. During June the average was 6¼ miles per machine. During 1920 a total of 160,330 acre-feet of water was delivered to 54,550 acres of land, of which 54,484 acres were cropped, giving a use of 2.94 acre-feet per acre. The use is low on account of the large area planted to cotton and may be expected to increase during the present year. The operation and maintenance charge was continued at $3.50 minimum for 2 acre-feet and $2 per acre-foot for additional water.

The extremely high spring flood of the Colorado River required an unusual amount of levee work and patroling. On June 28 the river began an attack on the levee at the 17-mile post below Yuma, which culminated three days later in a break about 1,200 feet wide through the levee and the West Main Canal, flooding 1,675 acres of land, of which 1,100 were cultivated. The break in the canal will be repaired before any land is damaged by shortage of water, but the expense of repairing the break will be heavy. During the year 67,000 cubic yards of rock revetment were placed on the levees.

Historical review, Yuma project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Area for which service was prepared to supply water	71,200	72,440	73,000	73,000	[1] 70,000	[1] 65,000
Acreage irrigated	27,857	29,483	36,956	45,670	53,284	54,550
Miles of canal operated	307	316	335	338	323.2	323.2
Water diverted (acre-feet)	246,786	249,700	337,597	314,900	478,185	468,900
Water delivered to land (acre-feet)	92,897	94,393	136,541	150,229	155,417	160,330
Acre-feet to acre for area under cultivation	3.34	3.2	3.7	3.3	2.9	2.94

[1] Reduction due to exclusion of North Gila Valley land and lands along levee subject to seepage.

SETTLEMENT.

Notwithstanding the depression resulting from the poor prices obtained for 1920 crop, considerable progress in development was made; several substantial public and private buildings were built, and some street paving, water, and sewer work was done. Farm lands are offered for sale at from $200 to $500 per acre.

Settlement data, Yuma project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Total number of farms on project (when completed)	4,000	4,000	4,000	4,000	5,190	5,750
Number of farms reported	737	790	900	1,185	1,225	1,230
Population	2,036	2,002	2,700	4,300	5,000	5,100
Number of towns	6	6	6	6	6	6
Population	4,385	5,345	6,735	7,590	7,600	7,110
Total population of towns and farms	6,421	7,347	9,435	11,890	12,600	12,210
Number of public schools	15	17	20	20	18	[1] 15
Number of churches	7	9	9	10	11	[2] 23
Number of banks	4	4	4	4	6	6
Total capital stock of banks				$175,000	$255,000	$255,000
Amount of deposits				$1,321,468	$1,923,287	$2,100,000
Number of depositors				4,572	5,288	9,175

[1] Reduction due to consolidation.
[2] Religious organizations; previous figures relate to church buildings.

PRINCIPAL CROPS.

The principal crops raised during 1920 were cotton (37,600 acres, or 69 per cent of the area cropped) and alfalfa (13,000 acres, or 24 per cent of the area).

Crop report, Yuma project, Arizona-California, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Average per acre.
Alfalfa hay	13,000	Ton	28,862	2.22	$15.00	$432,930	$33.30
Alfalfa seed	9,830	Pound	2,396,013	244.00	.22	527,110	53.61
Barley	130	Bushel	2,489	19.3	1.22	3,040	23.38
Corn sorghum	2,300	do	63,200	27.5	1.13	71,330	31.00
Corn fodder	84	Ton	118	1.4	17.54	2,070	24.64
Cane sugar	12	do	540	45.00	20.00	10,800	900.00
Cotton, short staple	27,600	Pound	9,870,000	394.00	.12	1,184,400	42.91
Cotton, long staple	10,000	do	1,378,000	139.00	1.56	771,680	77.17
Cotton seed		Ton	13,000		15.00	195,000	5.19
Fruit	110	Acre				10,600	96.36
Garden	206	do				23,180	112.53
Hay, other	142	Ton	253	1.8	14.09	3,560	25.07
Pasture	1,815	Acre			25.00	45,400	25.00

[1] Contract price: to be paid 30 cents in cash, balance in stock.

Crop report, Yuma project, Arizona-California, 1920—Continued.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Average per acre.
Wheat	51	Bushel	888	17.41	$2.70	$2,400	$47.06
Estimated additional revenue derived from pasturing stalk lands and feeding alfalfa straw						45,000	
Less duplicated areas	10,800						
Total cropped	54,480	Total and average				3,328,500	61.09
Irrigated, no crop: New land	70						
Total irrigated	54,550						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	60,000	1,230	92
Total irrigated area farms reported	54,550		84
Under water right applications	47,040	1,102	72
Under rental contracts	7,510	128	12
Total cropped area farms reported	54,484		84

PUBLIC NOTICES AND ORDERS.

ORDER, NOVEMBER 23, 1920.

On consideration of a petition dated November 8, 1920, from the Yuma County Water Users' Association and other organizations on Yuma project, Arizona, it is hereby ordered that the time in which water-right application must be made for the following classes of lands in said project is hereby extended to December 1, 1921, after which no irrigation water will be furnished thereto except under a water-right application:

1. Lands held in excess of 160 acres by any one person.
2. Lands held by nonresident owners.
3. Lands held under homestead entries in excess of one farm unit.

Water rental applications for the delivery of water to such lands up to December 1, 1921, will be received and accepted in pursuance of the rules and regulations heretofore in effect.

JOHN BARTON PAYNE, *Secretary.*

FINANCIAL STATEMENT.

Condensed financial statement, Yuma project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit		$330.15
Inventory of supplies and material on hand		62,016.63
Plant and equipment in use		179,810.80
Current accounts receivable		406,996.66
Construction charges not due		4,749,270.50
Unearned value of contracts		2,300.50
Construction cost of works	$8,824,222.77	
Operation and maintenance added to construction	26.32	
Operation and maintenance during construction	722,040.20	
Unadjusted clearing accounts	[1] 2,512.06	
Gross construction cost	9,543,777.23	
Less revenues and adjustments during construction period	405,052.50	
Net construction cost		9,138,724.73

[1] Contra.

Operation and maintenance cost under public notice		$1,202,643.15	
Less operation and maintenance added to construction		26.32	
Gross operation and maintenance cost		1,202,616.83	
Less revenues and adjustments		767,972.79	
Deficit Dec. 31, 1920	$315,177.22		
Net cost Jan. 1 to June 30, 1921	119,466.82		
			$434,644.04
Total debits			14,974,094.01

CREDITS.

Current accounts payable			44,704.67
Contingent and deferred liabilities			2,630.65
Resources for paying cost of project			5,875,035.02
Revenues held in reserve			28,895.01
Investment:—Disbursements and transfers from other projects		$11,353,345.18	
Less collections and transfers to other projects		2,330,516.52	
Net investment			9,022,828.66
Total credits			14,974,094.01

Construction cost and revenue, Yuma project.

Feature.	Cost fiscal year 1921.	Total to June 30, 1921.
Examination and surveys	$3,183.20	$256,009.12
Canal system	.....	3,572,726.91
Lateral system	1,114.16	1,513,718.64
Drainage system	51,045.84	525,217.84
Flood protection	[1] 2,119.44	2,718,175.39
Farm units	.....	32,514.60
Permanent improvements and lands	13,793.60	193,392.16
Telephone system	.....	12,468.11
Operation and maintenance during construction	.....	722,040.20
Operation and maintenance added to construction	.....	26.32
Unadjusted clearing	[1] 2,512.06	[1] 2,512.06
Gross cost of construction features	64,505.30	9,543,777.23
Less revenue earned during construction:		
Rental of buildings	10,370.66	16,753.90
Rental of irrigation water	252.50	346,767.88
Contractors freight refunds	.....	18,505.86
Other revenues, unclassified	600.00	23,966.27
Gain on hospital operations	606.52	849.64
Gain on railroad operations	[1] 4,300.27	199.42
Loss on uncollectible accounts	103.27	[1] 998.48
Field cost adjustments	[1] 991.99	[1] 991.99
Reimbursements for construction work performed under sundry contracts	[1] 101,302.19	.....
Total	[1] 94,661.50	405,052.50
Net construction cost, June 30, 1921	159,166.80	9,138,724.73

[1] Contra.

Operating cost and revenue, Yuma project.

Features.	Calendar year 1920.			Total to Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COST.						
Laguna dam and headworks	$5,121.33	$1,300.20	$6,421.53	$19,125.17	$43,681.02	$62,806.19
Main canal	7,267.41	76,245.41	83,512.82	17,065.61	80,026.81	97,092.42
Subtotal	12,388.74	77,545.61	89,934.35	36,190.78	123,707.83	159,898.61
Lateral system:						
Bard	4,742.72	18,928.53	23,671.25	61,233.50	123,336.95	184,570.45
Indian	5,630.01	14,068.43	19,698.44	26,669.68	68,442.63	95,112.31
Yuma Valley	31,722.45	107,103.73	138,826.18	92,303.18	235,734.68	328,037.86
Subtotal	42,095.18	140,100.69	182,195.87	180,206.36	427,514.26	607,720.62

Operating cost and revenue, Yuma project—Continued.

Features.	Calendar year 1920.			Total to Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COST—continued.						
Drainage:						
Reservation	$3,244.90	$7.84	$3,252.74	$13,440.89	$13,731.78	$27,172.67
Yuma Valley	12,276.49	1,310.96	13,587.45	26,729.25	1,310.96	28,040.21
Subtotal	15,521.39	1,318.80	16,840.19	40,170.14	15,042.74	55,212.88
Flood protection:						
Reservation		52,119.38	52,119.38		126,413.11	126,413.11
Yuma Valley		34,489.31	34,489.31		99,455.79	99,455.79
Subtotal		86,608.69	86,608.69		225,868.90	225,868.90
Gross cost	70,005.31	305,573.79	375,579.10	256,567.28	792,133.73	1,048,701.01
Less operation and maintenance charges added to construction			26.32			26.32
Balance			375,552.78			1,048,674.69
REVENUES.						
Accrued operation and maintenance charges			258,702.08			619,277.89
Interest and penalties on operation and maintenance			2,878.63			5,895.30
Rental of buildings			1,656.40			9,174.26
Rentals of irrigation water			[1] 19,654.45			100,878.70
Revenues, miscellaneous			521.59			1,908.39
Discounts			[1] 1,824.72			[1] 3,637.07
Total revenues			242,279.53			733,497.47
Difference, deficit			133,273.25			315,177.22

[1] Contra.

Cost by calendar years, Yuma project.

Year ending Dec. 31—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1907 and prior	$1,547,040.28		$12,877.07	$1,559,917.35				$1,559,917.35
1908	1,075,551.29		75,718.71	1,151,270.00				1,151,270.00
1909	728,922.25		43,752.80	772,675.05				772,675.05
1910	341,642.47		67,053.87	408,696.34	$29,423.42		$29,423.42	438,119.76
1911	849,454.08		64,101.12	913,555.20	30,623.61		30,623.61	944,178.81
1912	1,219,215.46		76,219.62	1,295,435.08	20,687.51		20,687.51	1,316,122.59
1913	336,636.71		48,376.71	385,013.42	15,843.61		15,843.61	400,857.03
1914	868,214.80		61,627.11	929,841.91	27,625.48		27,625.48	957,467.39
1915	598,026.10		76,000.66	674,026.76	34,582.57		34,582.57	708,609.33
1916	387,435.92		88,056.69	475,492.61	59,519.66		59,519.66	535,012.27
1917	333,052.15		108,255.84	441,307.99	28,024.86		28,024.86	469,332.85
1918	294,408.90		273.17	294,682.07	188,270.64		188,270.64	482,952.71
1919	84,702.14		*273.17	84,428.97	238,520.55		238,520.55	322,949.52
1920	118,963.69	$26.32		118,990.01	375,579.10	$26.32	375,552.78	494,542.79
1921, Jan. 1 to June 30	38,444.47			38,444.47	153,942.14		153,942.14	192,386.61
Total	8,821,710.71	26.32	722,040.20	9,543,777.23	1,202,643.15	26.32	1,202,616.83	10,746,394.06

Cost by fiscal years, Yuma project.

Year ending June 30—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1908 and prior	$2,007,851.47	.....	$64,150.04	$2,072,001.51	.....	.....	.....	$2,072,001.51
1909	1,109,199.79	.....	44,224.03	1,153,423.82	.....	.....	.....	1,153,423.82
1910	447,146.02	.....	44,901.36	492,047.38	$14,510.80	.....	$14,510.80	506,558.18
1911	520,225.46	.....	76,605.50	596,830.96	18,172.66	.....	18,172.66	615,003.62
1912	1,506,475.65	.....	68,688.85	1,575,164.50	36,045.93	.....	36,045.93	1,611,210.43
1913	396,193.21	.....	59,982.68	456,175.89	21,279.43	.....	21,279.43	477,455.32
1914	744,548.89	.....	54,301.28	798,850.17	17,830.39	.....	17,830.39	816,680.56
1915	715,230.46	.....	76,365.77	791,596.23	33,641.35	.....	33,641.35	825,237.58
1916	433,692.14	.....	83,015.25	516,707.39	54,859.59	.....	54,859.59	571,566.98
1917	305,640.79	.....	92,117.86	397,758.65	34,935.65	.....	34,935.65	432,694.30
1918	296,624.91	.....	57,960.75	354,585.66	85,158.23	.....	85,158.23	439,743.89
1919	131,209.48	.....	*273.17	130,936.31	263,351.15	.....	263,351.15	394,287.46
1920	143,167.14	$26.32	.....	143,193.46	329,365.85	$26.32	329,339.53	472,532.99
1921	64,505.30	.....	.....	64,505.30	293,492.12	.....	293,492.12	357,997.42
Total	8,821,710.71	26.32	722,040.20	9,543,777.23	1,202,643.15	26.32	1,202,616.83	10,746,394.06

Statement of general expense for fiscal year 1921 and to June 30, 1921.

Office.	Fiscal year 1921.	To June 30, 1921.
Washington office, Denver office, district counsel's office	$17,947.67	$440,918.08
Project office	18,928.43	589,598.15
Total	36,876.10	1,030,516.23
Per cent, general expense to gross cost	10.3	9.6

MESA DIVISION.

[Yuma Auxiliary project.]

LOCATION.

Counties: Yuma, Ariz.
Townships: 8 to 11 S., R. 22 to 25 W., Gila and Salt River meridian.
Railroads: Southern Pacific; San Diego and Arizona.
Project cities and towns: Yuma, 5,700.

WATER SUPPLY.

Source of water supply: Colorado River.
Area of drainage basin: 167,000 square miles above Laguna Dam.
Annual run-off in acre-feet of Colorado River at Yuma (225,000 square miles), 1902 to 1920: Mean, 16,900,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Length of irrigation season: 365 days.
Elevation of irrigable area: 130 to 215 feet above sea level.
Rainfall on irrigable area, 40-year average: 3.1 inches.
Rainfall on irrigable area, 1920: 4.75 inches.
Range of temperature on irrigable area: Highest temperature, 29-year average, 115° F.; lowest temperature, 29-year average, 28° F.
Character of soil of irrigable area: Fresno gravelly sand.
Principal products: Semitropical fruits.
Principal markets: Los Angeles, Calif.; and Arizona towns and eastern markets.

LANDS OPENED FOR IRRIGATION.

Dates of public notice: October 3, 1919.
Location of lands opened: Tps. 9 and 10 S., R. 23 W., Gila and Salt River meridian.
Limit of area of farm unit: 40 acres.
Building charge per acre of irrigable land: $200.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.
Yuma Auxiliary project act passed January 25, 1917.
Public notice issued for Mesa Division, Part One, October 3, 1919.
Auction sale of Mesa Division, Part One, December 10 to 13, 1919.
Construction authorized by Secretary, June 8, 1920.
Mesa Division 23 per cent completed on June 30, 1921.

IRRIGATION PLAN.

The irrigation of the Mesa Division provides for the diversion of water from the Colorado River at Laguna Dam, 10 miles northeast of Yuma, Ariz., into a canal system heading on the California side, crossing the river at Yuma through an inverted siphon, thence in canals down the valley to pump sites along this canal where the water is pumped to the mesa lands.

SUMMARY OF GENERAL DATA FOR YUMA PROJECT, MESA DIVISION, TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		45,000
Public land entered to June 30, 1921	5,800	
Public land open to entry June 30, 1921	276	
Public land withdrawn June 30, 1921	31,884	
Private land June 30, 1921	7,040	
Estimated acreage service can supply in season 1922		2,000
Finances:		
Appropriations—		
Fiscal year 1921—		
Proceeds, sales of water rights		$424,080.63
Increase of compensation		9,142.56
Proceeds, sales of lands		58,754.22
Total amount authorized		491,977.41
Encumbrances—		
Disbursements	$212,631.62	
Current liabilities	289,512.78	
Contingent liabilities	20,014.50	
Increase of compensation	9,142.56	
Total encumbrances		531,301.46
Unencumbered balances on July 1, 1921		[1] 39,324.05
Inventories:		
Value of stock on hand		31,578.01
Value of plant and equipment in use		53,849.13
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$432,338.17	
Less revenues and adjustments	7,194.49	
Net cost to June 30, 1921		425,143.68
Per cent complete June 30, 1921	23	
Per cent complete June 30, 1922	25	
Per cent complete June 30, 1923	27	
Value of construction water-right contracts and other sources to repay net cost of project		1,208,056.00
Revenues held in reserve		6,236.11

Status of returns to the auxiliary fund on account of construction contracts and various classes of revenue as of June 30, 1921.

Accounts.	Due.	Cash collected.	Uncollected.
Construction charges	$604,028.00	$402,320.03	$201,707.97
Freight refund	6.32	.....	6.32
Miscellaneous	709.82	693.12	16.70
Total	604,744.14	403,013.15	201,730.99

[1] Credit.

CONSTRUCTION DURING FISCAL YEAR.

The construction of the Yuma Mesa Division was commenced on September 27, 1920, when George Company, working under contract No. 832, commenced work on schedule 1 of specifications No. 388. Work done under contract No. 832 was completed in January, 1921, and final estimate made on January 24, 1921. On February 8, 1921, road construction work was commenced and carried on with full force until May. Five miles of rock road were built in Part One. Construction of the B Lift Pumping Plant was started in March, 1921, and on June 30 the building was complete up to and including the motor floor. The erection of crusher plant and building for the manufacture of concrete pipe was practically complete on June 30, 1921.

Status of land sale, Mesa Division, Part One.

	No. farm units.	Gross area.	Irrigable area.	Value of water right.	Sale price of land.	Total value land and water right.
		Acres.	*Acres.*			
Sold at auction from Dec. 10–13, 1919	438	4,967.94	4,931.99	$986,398.00	$142,144.25	$1,128,542.25
Sold by sealed bids Jan. 20 to June 30, 1921, inclusive	80	1,118.29	1,118.29	219,658.00	28,546.15	248,204.15
Total	518	6,086.23	6,050.28	1,206,056.00	170,690.40	1,376,746.40

FINANCIAL STATEMENT.

Condensed financial statement, Yuma Auxiliary project, June 30, 1921.

DEBITS.

Inventory of materials and supplies on hand		$31,578.01
Plant and equipment in use		53,849.13
Current accounts receivable		201,730.99
Construction charges not due		589,196.63
Unearned value of contracts		20,014.50
Construction cost of works	$431,709.85	
Unadjusted clearing accounts	628.32	
Gross construction cost	432,338.17	
Less revenues and adjustments during construction period	7,194.49	
Net construction cost		425,143.68
Total debits		1,321,512.94

CREDITS.

Current accounts payable		289,512.78
Contingent and deferred liabilities		20,014.50
Resources for repaying cost of project		1,214,292.11
Investment:		
Disbursements	$221,774.18	
Less collections	424,080.63	
Net investment		[1] 202,306.45
Total credits		1,321,512.94

[1] Contra.

Construction cost and revenue, Yuma Auxiliary project.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and surveys	$33,572.31	$33,572.31
Pumping for irrigation	56,641.51	56,641.51
Canal system	237,143.38	237,143.38
Lateral system	35,486.64	35,486.64
Flood protection	9,020.00	9,020.00
Farm units	837.00	837.00
Permanent improvements	58,747.01	58,747.01
Telephone system	262.00	262.00
Unadjusted clearing	628.32	628.32
Gross cost	432,338.17	432,338.17
Revenues and cost adjustments:		
Freight refunds	6.32	6.32
Hospital operation	560.68	560.68
Field cost adjustments	6,627.49	6,627.47
Total revenues	7,194.49	7,194.49
Net cost	425,143.68	425,143.68

Cost of construction by calendar years, Yuma Auxiliary project.

Year ending December 31—	
1920	$36,034.34
1921 to June 30	396,303.83
Total	432,338.17

Cost of construction by fiscal years, Yuma Auxiliary project.

Year ending June 30, 1921	$432,338.

General expense, Yuma Auxiliary project.

	Fiscal year 1921.	To June 30, 1921.
Washington office	$3,012.30	$3,012.30
Denver office	1,615.59	1,615.59
Project office	10,452.64	10,452.64
District counsel	15.48	15.48
Other offices	1,275.20	1,275.20
Total	16,371.21	16,371.21
Percentage of general expense to gross cost	3.8	3.8

Does not include any general expense for cost of $252,000 transferred from Yuma project.

CALIFORNIA, ORLAND PROJECT.

A. N. Burch, project manager, Orland, Calif.

LOCATION.

Counties: Glenn and Tehama; reservoir and storage feed canal in Colusa County.

Townships: 21 to 23 N., Rs. 2 to 4 W., Mount Diablo meridian.

Railroads and other transportation lines: Southern Pacific Railroad and steamers on Sacramento River.

Project cities and towns and estimated population June 30, 1921: Orland, 1 700; railroad flag stations with freight sidetracks, Greenwood, Wyo., and Malton.

WATER SUPPLY.

Source of water supply, Stony Creek.

Area of drainage basin: Above project diversion dams, 735 square miles; above feed canal diversion dam, 97 square miles; above East Park Dam (Little Stony), 102 square miles.

Annual run-off in acre-feet: Stony Creek, near Fruto (601 square miles), 1907 to 1920—maximum, 940,000; minimum, 135,200; mean, 401,000. Little Stony Creek, at East Park (102 square miles), 1907 to 1920—maximum, 170,800; minimum, 12,600; mean, 57,400.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1921: 20,533 acres.[1]

Area under water-right applications, season of 1921: 19,295 acres.

Length of irrigation season, 1920: From February to November—267 days.

Average elevation of irrigable area: 250 feet above sea level.

Rainfall on irrigable area: 1883 to 1920—average, 18.4 inches; 1920, 15.27 inches.

Average of highest recorded temperatures: 1910 to 1920, 112.2° F.; average of lowest recorded temperatures: 1910 to 1920, 26.0° F.

Character of soil of irrigable area: Sandy and gravelly loam, silt loam, clay loam.

Principal products: Alfalfa, milo, citrus and other fruits, nuts, and vegetables.

Principal markets: San Francisco, Calif.; Portland, Oreg.; eastern markets.

LANDS OPENED FOR IRRIGATION.

Dates of orders and public notices: April 26 and May 24, 1916; February 8 and 21, 1917; March 22 and April 2, 1918; February 20, 1920.

Location of lands opened: Tps. 21 and 22 N., R. 2 W.; Tps. 21, 22, and 23 N., R. 3 W.; Tps. 22 and 23 N., R. 4 W., Mount Diablo base and meridian.

Limit of area of farm units: 40 acres, except that original subscribers are qualified to make water-right applications for an area not to exceed 160 acres.

Building charge per acre of irrigable land: $44; $55, including supplemental construction.

Charge per irrigable acre, under supplemental contract for lining canals and laterals with concrete: $11.

Annual operation and maintenance charge: $2 per irrigable acre, permitting the delivery of 3 acre-feet of water; 25 cents for the first three additional acre-feet, and 50 cents per acre-foot for all further quantities.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1906.

Construction recommended by board of engineers November 12, 1906.

Construction authorized by Secretary, October 5, 1907.

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[1] Includes 320 acres of vested water-rights and 46 acres of town and school sites.

the winter season by building open drains where needed to connect with natural channels. Incidentally this will provide for any needed drainage during the irrigation season. As most of the project requires little of this work, other than that which should be done by the farmers as a regular part of their plans in preparing their lands for irrigation, the situation can be best and most economically handled in cooperation with the landowners as development proceeds. This work was commenced in 1916 and will be continued as occasion arises, utilizing a small amount of funds provided for this purpose in fixing the building cost of the project.

ECONOMIES OF GOVERNMENT WORK.

There was an average increase of 23 per cent in labor and 40 per cent in the cost of materials entering into concrete lining as compared with 1918. The cost of lining performed by Government forces increased 21 per cent.

OPERATION AND MAINTENANCE.

The average run-off of Stony Creek watershed was only about 13 per cent of the 17-year average and only 42 per cent of East Park storage capacity was realized. On May 1 it was necessary to apportion the available water, which was sufficient to produce an alfalfa yield of only about one-half the average and to provide adequate moisture for orchard and general crops with proper cultivation. The operating season was the longest in the history of the project, beginning January 25 and terminating October 18. The entire system, consisting of storage works, feed canal, and 138 miles of canals and laterals, was operated without any washouts of consequence, flood damage, or extensive renewals.

Historical review, Orland project, by calendar years.

Item.	1916	1917	1918	1919	1920
Acreage for which service was prepared to supply water	[1] 20,533	[1] 20,533	[1] 20,533	[1] 20,533	[1] 20,533
Acreage irrigated	9,357	12,729	14,764	15,203	13,870
Miles of canal operated	128	138	138	138	138
Water stored (acre-feet)	48,000	51,000	46,900	51,000	62,000
Water diverted (acre-feet)	60,000	74,000	45,900	72,000	33,800
Water delivered to land (acre-feet)	38,100	44,400	28,300	45,000	20,600
Per acre of land irrigated (acre-feet)	4.07	3.50	2.91	2.95	1.49

[1] Includes 320 acres of vested water rights and 46 acres of town and school sites.

SETTLEMENT AND DEVELOPMENT.

Owing to drought conditions, no new land was brought under irrigation. There was an increase in the number of people living on the farms under irrigation, but it was less than the average rate for past years. Changes of ownership involved improved property for the most part.

Settlement data, Orland project, by calendar years.

	1916	1917	1918	1919	1920
Total number of farms on project	509	699	725	846	908
Population	1,700	1,900	2,000	2,200	2,200
Number of irrigated farms	384	531	593	602	644
Operated by owners	342	483	549	549	592
Operated by tenants	42	48	44	53	52
Population	1,260	1,518	1,589	1,768	1,844
Number of towns	1	1	1	1	1
Population	1,550	1,550	1,600	1,700	1,700
Total population	3,250	3,450	3,600	3,900	3,900
Number of public schools	8	8	9	10	10
Number of churches	7	7	7	7	7
Number of banks	2	2	2	2	2
Total capital stock	$141,000	$141,000	$141,000	$141,000	$196,000
Amount of deposits	$445,000	$755,000	$950,000	$1,100,000	$1,020,000
Number of depositors	1,800	2,420	2,800	3,000	2,900

PRINCIPAL CROPS.

Owing to the limited water supply, about 1,300 acres less than for the preceding year were cropped. The price of hay was fairly high during the season, but the yield was about one-half the ordinary average. Alfalfa continued to lead with an acreage of 5,500, followed by 1,600 acres of milo. The crop value on the farms irrigated was $49.80 per acre, a decrease of $22.10 from that of the preceding year. Owing to a decline in prices, the late fruit and nut crops failed to yield satisfactory returns.

The extremely high prices for mill and other stock feeds resulted in the disposal of about one-fifth of the project dairy stock and one-half of the hogs. The stock and equipment inventory showed a value of $792,000.

Crop report, Orland project, California, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	5,505	Ton	13,760	2.5	$21.00	$288,960	$52.50
Other hay	924	...do	1,180	1.3	24.00	28,320	30.68
Pasture	3,720					40,440	10.87
Corn, sorghum	1,582	Bushel	48,000	30.3	1.50	72,000	45.54
Wheat	80	...do	1,360	17.0	1.90	2,585	32.30
Barley	1,107	...do	26,660	24.0	.90	23,995	21.67
Citrus fruits	140	Box [1]	3,080	22.0	3.00	9,240	66.00
Deciduous fruits [2]	172	Pound	412,500	2,400	.04	16,500	95.93
Small fruits	20	...do	30,000	1,500	.15	4,500	225.00
Prunes, dried	120	...do	69,500	579	.08	6,255	52.12
Almonds	513	...do	140,000	273	.20	28,000	54.58
Garden	103					12,705	123.35
Nursery	12					12,000	1,000.00
Miscellaneous	42					4,200	100.00
Less duplicated areas	3,000						
Total cropped	11,040	Total and average				549,700	49.80

Irrigated, no crops:	
Nonbearing orchard	1,990
Young alfalfa	700
Not cropped	220
Less duplicated areas	80
Total irrigated	13,870

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	16,185	644	79
Total irrigated area farms reported:			
Irrigated under water-right applications	13,710	642	67
Irrigated under vested rights	160	2	.....
Total cropped area farms reported	11,040	644	54

[1] Box of oranges weighs 60 pounds.

[2] Peaches, apricots, plums, etc.

the winter season by building open drains where needed to connect with natural channels. Incidentally this will provide for any needed drainage during the irrigation season. As most of the project requires little of this work, other than that which should be done by the farmers as a regular part of their plans in preparing their lands for irrigation, the situation can be best and most economically handled in cooperation with the landowners as development proceeds. This work was commenced in 1916 and will be continued as occasion arises, utilizing a small amount of funds provided for this purpose in fixing the building cost of the project.

ECONOMIES OF GOVERNMENT WORK.

There was an average increase of 23 per cent in labor and 40 per cent in the cost of materials entering into concrete lining as compared with 1918. The cost of lining performed by Government forces increased 21 per cent.

OPERATION AND MAINTENANCE.

The average run-off of Stony Creek watershed was only about 13 per cent of the 17-year average and only 42 per cent of East Park storage capacity was realized. On May 1 it was necessary to apportion the available water, which was sufficient to produce an alfalfa yield of only about one-half the average and to provide adequate moisture for orchard and general crops with proper cultivation. The operating season was the longest in the history of the project, beginning January 25 and terminating October 18. The entire system, consisting of storage works, feed canal, and 138 miles of canals and laterals, was operated without any washouts of consequence, flood damage, or extensive renewals.

Historical review, Orland project, by calendar years.

Item.	1916	1917	1918	1919	1920
Acreage for which service was prepared to supply water	[1] 20,533	[1] 20,533	[1] 20,533	[1] 20,533	[1] 20,533
Acreage irrigated	9,357	12,729	14,764	15,203	13,870
Miles of canal operated	128	138	138	138	138
Water stored (acre-feet)	48,000	51,000	46,900	51,000	62,000
Water diverted (acre-feet)	60,000	74,000	45,900	72,000	33,800
Water delivered to land (acre-feet)	38,100	44,400	28,300	45,000	20,600
Per acre of land irrigated (acre-feet)	4.07	3.50	2.91	2.95	1.49

[1] Includes 320 acres of vested water rights and 46 acres of town and school sites.

SETTLEMENT AND DEVELOPMENT.

Owing to drought conditions, no new land was brought under irrigation. There was an increase in the number of people living on the farms under irrigation, but it was less than the average rate for past years. Changes of ownership involved improved property for the most part.

Settlement data, Orland project, by calendar years.

	1916	1917	1918	1919	1920
Total number of farms on project	509	699	725	846	908
Population	1,700	1,900	2,000	2,200	2,200
Number of irrigated farms	384	531	593	602	644
Operated by owners	342	483	549	549	592
Operated by tenants	42	48	44	53	52
Population	1,260	1,518	1,589	1,768	1,844
Number of towns	1	1	1	1	1
Population	1,550	1,550	1,600	1,700	1,700
Total population	3,250	3,450	3,600	3,900	3,900
Number of public schools	8	8	9	10	10
Number of churches	7	7	7	7	7
Number of banks	2	2	2	2	2
Total capital stock	$141,000	$141,000	$141,000	$141,000	$196,000
Amount of deposits	$445,000	$755,000	$950,000	$1,100,000	$1,020,000
Number of depositors	1,800	2,420	2,800	3,000	2,900

PRINCIPAL CROPS.

Owing to the limited water supply, about 1,300 acres less than for the preceding year were cropped. The price of hay was fairly high during the season, but the yield was about one-half the ordinary average. Alfalfa continued to lead with an acreage of 5,500, followed by 1,600 acres of milo. The crop value on the farms irrigated was $49.80 per acre, a decrease of $22.10 from that of the preceding year. Owing to a decline in prices, the late fruit and nut crops failed to yield satisfactory returns.

The extremely high prices for mill and other stock feeds resulted in the disposal of about one-fifth of the project dairy stock and one-half of the hogs. The stock and equipment inventory showed a value of $792,000.

Crop report, Orland project, California, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	5,505	Ton	13,760	2.5	$21.00	$288,960	$52.50
Other hay	924	...do	1,180	1.3	24.00	28,320	30.68
Pasture	3,720					40,440	10.87
Corn, sorghum	1,582	Bushel	48,000	30.3	1.50	72,000	45.54
Wheat	80	...do	1,360	17.0	1.90	2,585	32.30
Barley	1,107	...do	26,660	24.0	.90	23,995	21.67
Citrus fruits	140	Box [1]	3,080	22.0	3.00	9,240	66.00
Deciduous fruits [2]	172	Pound	412,500	2,400	.04	16,500	95.93
Small fruits	20	...do	30,000	1,500	.15	4,500	225.00
Prunes, dried	120	...do	69,500	579	.08	6,255	52.12
Almonds	513	...do	140,000	273	.20	28,000	54.58
Garden	103					12,705	123.35
Nursery	12					12,000	1,000.00
Miscellaneous	42					4,200	100.00
Less duplicated areas	3,000						
Total cropped	11,040	Total and average				549,700	49.80
Irrigated, no crops:							
Nonbearing orchard	1,990						
Young alfalfa	700						
Not cropped	220						
Less duplicated areas	80						
Total irrigated	13,870						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	16,185	644	79
Total irrigated area farms reported:			
Irrigated under water-right applications	13,710	642	67
Irrigated under vested rights	160	2	.....
Total cropped area farms reported	11,040	644	54

[1] Box of oranges weighs 60 pounds. [2] Peaches, apricots, plums, etc.

FINANCIAL STATEMENT.

Condensed financial statement, Orland project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$59.70
Inventory of materials and supplies on hand			5,063.06
Plant and equipment in use			6,833.12
Current accounts receivable			69.18
Construction charges not due			931,595.83
Unearned value of contracts			237.60
Construction cost of works		$1,038,301.78	
Operation and maintenance during construction		107,657.23	
Gross construction cost		1,145,959.01	
Less revenues and adjustments during construction period		130,031.71	
Net construction cost			1,015,927.30
Operation and maintenance cost under public notice		150,745.18	
Less revenues and adjustments		126,807.55	
Deficit to Dec. 31, 1920	$41.95		
Net cost Jan. 1 to June 30, 1921	23,895.68		
			23,937.63
Investment items in transit			508.63
Total debits			1,984,232.05

CREDITS.

Current accounts payable		3,917.76
Contingent and deferred liabilities		297.30
Resources for repaying cost of project		1,061,485.32
Revenues held in reserve		74.24
Investment:		
Disbursements and transfers from other projects	$1,329,598.87	
Items in transit	508.63	
Total	1,330,107.50	
Less collections and transfers to other projects	411,650.07	
Net investment		918,457.43
Total credits		1,984,232.05

Construction cost and revenue, Orland project.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and surveys:		
Orland division		$4,135.90
Stony Gorge division	$26.00	7,823.00
Total examination and surveys	26.00	11,958.90
Storage system:		
East Park Reservoir surveys		4,060.84
East Park Dam, spillway and dikes		154,002.40
East Park Reservoir, clearing site		88,469.02
East Park spillway		29,470.79
East Park feed canal		91,186.23
Diversion dam		24,367.01
Headworks		6,704.16
Salt Creek siphon		4,747.74
Terminal chute		5,619.22
Salt Creek chute		3,463.45
County road bridges		2,350.01
Minor structures		3,137.47
Culverts		4,642.93
Raising spillway, East Park Dam		11,431.83
East Park feed canal, concrete lining		18,211.88
East Park Dam, additional gates		1,338.08
Total storage system		453,203.06
Canal system:		
North Canal		24,600.96
South Canal		66,869.93
South diversion dam		26,060.08
South diversion conduit		1,707.88
South diversion headgates		4,242.55
South diversion sluiceway		5,049.76
North diversion dam		3,968.54
North diversion headworks		1,237.04

Construction cost and revenue, Orland project—Continued.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Canal system—Continued.		
High Line Canal—		
South		$21,172.61
Flume		7,074.97
Chute		2,178.28
Concrete lining		1,899.98
South Canal, railroad crossing		673.45
South Canal, excavating plant		4,916.21
Total canal system		171,592.24
Lateral system:		
Laterals and sublaterals	$160.76	88,588.03
Minor structures—		
Concrete	394.68	60,664.70
Pipe		6,300.53
Timber		2,245.14
Metal		146.63
1½-inch concrete lining		95,077.68
24-inch pipe line on lateral 12		2,648.51
Railroad crossings under Southern Pacific tracks		6,251.43
Total lateral system	555.44	261,922.65
Flood protection, levees and dikes		499.72
Farm units		1,360.59
Permanent improvements:		
Buildings and permanent improvements		15,042.47
Power line, dismantled		271.72
Supplemental construction:		
1½-inch concrete lining, canal system	23,964.85	55,080.89
1½-inch concrete lining, lateral system	31,935.96	67,369.54
Operation and maintenance during construction		107,657.23
Gross construction cost	56,482.25	1,145,959.01
Less revenues accrued during construction period:		
Rentals of buildings	1,080.00	2,134.00
Rentals of irrigation water		119,090.22
Contractors' freight refunds		1,832.02
Other revenues unclassified	5,017.00	6,970.47
Doubtful accounts		5.00
	6,097.00	130,031.71
Net construction cost to June 30, 1921	50,385.25	1,015,927.30

Operating cost and revenue, Orland project.

Features.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COST.						
Storage system:						
East Park dam	$2,329.06	$185.38	$2,514.44	$7,194.72	$8,015.00	$15,209.72
East Park feed canal	1,320.80	321.59	1,642.39	2,908.53	1,691.10	4,599.63
	3,649.86	506.97	4,156.83	10,103.25	9,706.10	19,809.35
Canal system:						
North diversion dam	235.35		235.35	255.57	78.36	333.93
South diversion dam	3.50		3.50	46.98	86.13	133.11
	238.85		238.85	302.55	164.49	467.04
Lateral system:						
North side	3,319.82	2,573.70	5,893.52	12,764.86	17,275.12	30,039.98
South side	7,611.03	11,566.83	19,177.86	26,470.41	41,415.39	67,885.80
	10,930.85	14,140.53	25,071.38	39,235.27	58,690.51	97,925.78
Adjudication of water rights along Stony Creek		3,322.33	3,322.33		10,208.82	10,208.82
Farming operations, loss				199.29		199.29
Total	14,819.56	17,969.83	32,789.39	49,840.36	78,769.92	128,610.28

Operating cost and revenue, Orland project—Continued.

	Calendar year 1920.	To Dec. 31, 1920.
REVENUES.		
Operation and maintenance charges (accrued on contracts with water-right applicants)	$40,359.67	$131,661.92
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	5.59	15.54
Rental of land and buildings during operating period	[1] 720.00	.....
Rentals of irrigation water	.....	834.78
Other revenues unclassified earned during operating period	260.93	544.44
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants (contra)	[1] 1,638.30	[1] 4,488.35
Total	38,267.89	128,568.33
Difference:		
Excess	5,478.50	.....
Deficit	.....	41.95

[1] Contra.

Cost by calendar years, Orland project.

	Construction.			Operation and maintenance, original.	Grand total.
	Original.	Operation and maintenance, during.	Total.		
Year ending Dec. 31—					
1906	$7,213.19	.....	$7,213.19	.....	$7,213.19
1907	48,106.71	.....	48,106.71	.....	48,106.71
1908	117,351.53	.....	117,351.53	.....	117,351.53
1909	113,988.22	.....	113,988.22	.....	113,988.22
1910	173,159.82	$1,456.88	174,616.70	.....	174,616.70
1911	74,414.97	11,412.34	85,827.31	.....	85,827.31
1912	16,488.92	18,342.71	34,831.63	.....	34,831.63
1913	29,564.35	17,229.28	46,793.63	.....	46,793.63
1914	177,089.08	19,814.16	196,903.24	.....	196,903.24
1915	95,491.76	19,292.40	114,784.16	.....	114,784.16
1916	34,034.80	24,444.74	58,479.54	.....	58,479.54
1917	14,379.70	[1] 4,332.88	10,046.82	$31,510.96	41,557.78
1918	15,760.58	[1] 2.40	15,758.18	31,083.79	46,841.97
1919	34,140.53	.....	34,140.53	33,226.14	67,366.67
1920	53,558.15	.....	53,558.15	32,789.39	86,347.54
Jan. 1 to June 30, 1921	33,559.47	.....	33,559.47	22,134.90	55,694.37
Total	1,038,301.78	107,657.23	1,145,959.01	150,745.18	1,296,704.19

[1] Contra.

Cost by fiscal years, Orland project.

	Construction.			Operation and maintenance, original.	Grand total.
	Original.	Operation and maintenance during.	Total.		
Year ending June 30—					
1906	$276.73	.....	$276.73	.....	$276.73
1907	10,019.66	.....	10,019.66	.....	10,019.66
1908	126,711.08	.....	126,711.08	.....	126,711.08
1909	59,402.42	.....	59,402.42	.....	59,402.42
1910	199,568.73	$1,356.18	200,924.91	.....	200,924.91
1911	103,524.38	4,141.36	107,665.74	.....	107,665.74
1912	45,533.68	17,019.73	62,553.41	.....	62,553.41
1913	11,780.79	20,872.72	32,653.51	.....	32,653.51
1914	61,160.78	15,266.26	76,427.04	.....	76,427.04
1915	203,470.40	20,240.24	223,710.64	.....	223,710.64
1916	54,947.66	20,257.74	75,205.40	.....	75,205.40
1917	21,684.91	13,127.43	34,812.34	$12,046.62	46,858.96
1918	9,847.62	[1] 4,624.43	5,223.19	34,320.84	39,544.03
1919	27,995.60	.....	27,995.60	31,144.92	59,140.52
1920	45,895.09	.....	45,895.09	35,827.07	81,722.16
1921	56,482.25	.....	56,482.25	37,405.73	93,887.98
Total	1,038,301.78	107,657.23	1,145,959.01	150,745.18	1296,704.19

[1] Contra.

General expense, Orland project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$956.34	$1,361.72	$2,318.06	$19,035.81	$5,570.57	$24,606.38
Project office	3,842.00	5,475.90	9,317.90	85,720.60	27,667.22	113,387.82
Denver office	370.29	528.48	898.77	2,375.70	2,920.64	5,296.34
District counsel's office	152.49	2,259.88	2,412.37	3,456.24	6,806.00	10,262.24
Other offices and miscellaneous	172.66	246.41	419.07	27,308.22	537.06	27,845.28
Total	5,493.78	9,872.39	15,366.17	137,896.57	43,501.49	181,398.06
Percentage of general expense to gross cost	9.8	26.4	16.4	13.2	16.6	14.0

COLORADO, GRAND VALLEY PROJECT.

S. O. HARPER, project manager, Grand Junction, Colo.

LOCATION.

County: Mesa.

Townships: 1 N., Rs. 1 E. and 1 to 3 W.; 2 N., Rs. 2 and 3 W.; 1 S., Rs. 1 E. and 1 W., Ute meridian. 9 S., Rs. 101 to 104 W.; 10 S., Rs. 98, 101, and 103 W.; 11 S., Rs. 98 and 99 W., sixth principal meridian.

Railroads: Denver & Rio Grande; Grand River Valley.

Project cities and towns and estimated population, June 30, 1921: Palisade, 900; Clifton, 200; Grand Junction, 9,000; Fruita, 1,200; Loma, 40; Mack, 75.

WATER SUPPLY.

Source of water supply: Colorado River.

Area of drainage basin: 8,550 square miles above Palisade.

Annual run-off in acre-feet of Colorado River at Palisade, 1902 to 1920: Maximum, 5,466,600; minimum, 2,300,000; mean, 3,798,300.

Discharge, in second-feet, of Colorado River at Palisade, 1902 to 1920: Maximum, 50,000; minimum, 1,102.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1921: 38,400 acres.

Area under rental contracts season of 1921 (to June 30): 21,000 acres.

Area in Palisade and Mesa County Irrigation Districts under special contracts, season of 1921: 8,400 acres.

Length of irrigation season: From April 1 to October 31, 214 days.

Average elevation of irrigable area: 4,700 feet above sea level.

Rainfall on irrigable area: For 28 years, average, 8.30 inches; 1920, 9.29 inches.

Range of temperature on irrigable area: For 28 years' average, highest, 99° F.; average lowest, −7° F.

Character of soil on irrigable area: Sandy loam, sandy mesas, and adobe.

Principal products: Alfalfa, sugar beets, grain, fruit, vegetables.

Principal markets: Large cities east of Rocky Mountains for fruit; other products, local.

LANDS OPENED FOR IRRIGATION.

Dates of orders: January 25, 1917; February 21, 1918; March 25, 1919; February 28, 1920.

Location of lands opened: Tps. 1 N., Rs. 1 and 2 W.; 2 N., Rs. 2 and 3 W.; 9 S., Rs. 103 and 104 W.

Limit of area of farm units: 40 to 80 acres.

Duty of water: 3.5 acre-feet per acre per annum at the farm.

Charges per acre of irrigable land: No lands have been opened under public notice, and the building charge has not been announced. The project is at present being operated on a rental basis.

In addition to the project lands, the Service supplies 120 second-feet of water for 8,400 acres included in the Palisade and Mesa County Irrigation Districts under special contracts with these districts.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in September, 1902.

Construction recommended by board of engineers December 15, 1908.

Purchase of rights of way authorized by Secretary November 4, 1911.

Construction authorized by Secretary September 23, 1912.

First irrigation by Reclamation Service season of 1915.

Cooperative drainage work in Grand Valley drainage district begun March, 1918.

Price-Stub pumping plant completed and water supplied to Palisade and Mesa County Irrigation Districts April, 1919.

Entire project 84.3 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Grand Valley project provides for the diversion of water from the Colorado River by means of a diversion dam located about 8 miles northeast of Palisade, Colo., into a canal system on the north side of the river for the irrigation of lands lying north and west of Grand Junction, Fruita, and Mack, Colo. About 35,000 acres will be supplied by gravity and 10.000 acres by electrically operated pumping plants to be located on the gravity canal. Power for pumping will be developed in a power plant to be located at the upper portal of Tunnel No. 3. On the first 6 miles of the main canal, located in the canyon of the Colorado River, there are three tunnels, respectively, 3,723, 1,655, and 7,292 feet long. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The diversion dam, the first 55 miles of the main canal, and the lateral system to serve 30,000 acres of the gravity division of the project have been completed, with the exception of a few sublaterals and a large number of turnouts and weirs, which will be installed as needed. A pumping plant and other works to supply 8,400 acres in the Palisade and Mesa County Irrigation Districts have also been completed.

There remain to be completed the last 7 miles of the main canal, laterals to serve 5,000 acres of the gravity division, the power and pumping systems, and such drainage and flood-protection works as may be required.

SUMMARY OF GENERAL DATA FOR GRAND VALLEY PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		45,000
Public land entered to June 30, 1921	13,478	
Public land open to entry on June 30, 1921	367	
Public land withdrawn on June 30, 1921	12,310	
Private land June 30, 1921	18,845	
Acreage Service could have supplied in season of 1920		38,400
Estimated acreage Service can supply in season 1921		38,400
Estimated acreage Service can supply in season 1922		38,400
Acreage irrigated season of 1920		11,730
Acreage cropped under irrigation season of 1920		10,760
Crops:		
Value of irrigated crops season of 1920		$525,360.00
Value of irrigated crops per acre cropped		48.80
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$208,000.00	
Miscellaneous collections and transfers issued	51,692.16	
Increase compensation	17,896.88	
Total amount authorized		277,589.04
Encumbrances—		
Disbursements and transfers received	173,626.74	
Current liabilities	15,670.60	
Contingent liabilities	2,925.00	
Increase of compensation	17,896.88	
Total encumbrances		210,119.22
Unencumbered balance on July 1, 1921		67,469.82
Fiscal year 1922—		
Amount specified in appropriation act		377,000.00
Fiscal year 1923—		
Proposed appropriation		440,000.00
Inventories:		
Value of stock on hand		45,175.08
Value of plant and equipment in use		52,852.19
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$3,855,712.35	
Less revenues and adjustments	130,613.43	
Net cost to June 30, 1921		3,725,098.92
Per cent completed on June 30, 1921	84.3	
Estimated per cent completed on June 30, 1922	86.6	
Estimated per cent completed on June 30, 1923	88.9	
Drainage:[1]		
Total cost of drainage works to June 30, 1921		$118,445.43
Miles of drains built to June 30, 1921—		
Open	55.2	
Closed	1.0	
Total		56.2
Estimated acreage damaged by seepage on June 30, 1921		30,800
Estimated acreage protected by drains to June 30, 1921		11,100
Estimated acreage to be protected by authorized system		12,600

[1] Includes work in Grand Valley Drainage District.

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected (cash).	Uncollected.
Rentals, irrigation water	$109,937.78	$99,724.22	$10,213.56
Rentals, grazing and farming lands	184.00	122.00	62.00
Contractors' freight refunds	8,118.15	8,098.02	20.13
Miscellaneous	6,953.39	6,795.09	158.30
Total	125,193.32	114,739.33	10,453.99

CONSTRUCTION DURING FISCAL YEAR.

Lateral system.—Work on the lateral system was carried on along the same lines as during the preceding year, consisting of the construction of lateral extensions to supply lands not previously farmed, together with the installation of necessary minor structures required for making deliveries to new lands. This work, which was all performed by the regular operation and maintenance forces, involved the excavation of 3,800 cubic yards of earth and the installation of the following timber structures: Five bridges, 41 checks, 41 culverts, 5 drops, 3 flumes, 1 pipe line, 2 main canal turnouts, and 156 weirs.

Drainage system.—The construction of drains to reclaim the seeped areas on the project was prosecuted during the year with an average of two drag-line excavators working two shifts per day. Ten and one-tenth miles of open drain were completed during the year. The work was confined to the three largest areas of seeped land located, respectively, near the Little Salt Wash, north of Loma, and northwest of Mack.

The construction of the cooperative system of drains and outlets through the Grand Valley Drainage District under the terms of the contract dated November 22, 1917, was continued during the year. The completion of this work was delayed on account of the necessity of diverting some of the equipment and organization to more urgently needed work on the project lands. Ten and seven-tenths miles of open drain and 0.2 mile of closed drain were constructed, and at the end of the fiscal year less than 1 mile of drain remained to be completed under this contract.

The total drainage work accomplished during the year on all features consisted of 20.8 miles of open drain and 0.2 mile of closed drain, involving 571,000 cubic yards of excavation, and the installation of 35 bridges, 59 flumes, 14 culverts, and 61 minor miscellaneous structures. Three Monighan 1-cubic yard machines were used on the work throughout the year and one P. & H. half-yard drag line was put into operation in February, 1921.

Permanent improvements.—The following work was completed during the year: A 2-room addition to foreman's house at maintenance Camp No. 7, corrugated-iron garages at Camps 5 and 7, and a cistern for the ditch-riders' quarters at Little Salt Wash.

SEEPAGE AND DRAINAGE.

The drains constructed on the project during the fiscal year are giving excellent results and the seeped area was materially reduced. It is estimated that 1,500 acres of land have been protected by the constructed drains and that less than 500 acres are now damaged

by seepage, most of which will be reclaimed when the work now in progress is completed. There are a large number of small seeped areas scattered over the project, some of which can probably not be drained at a feasible cost. Work has been continued on the survey and investigation of these areas throughout the year and plans have been made to proceed with the construction of the drains necessary to prevent any large acreage of land from becoming nonproductive. On account of the extremely variable soil conditions encountered on the project the drainage investigations necessary for the proper location of the drains requires a large number of borings and much detailed study.

In the Grand Valley Drainage District the work under the present contract is practically completed and the district has been considering the question of financing the construction of a complete system, but as yet no definite progress has been made along this line. The drains so far completed have been in most cases of marked benefit and the general sentiment among the people of the district is strongly in favor of securing a complete drainage system. The unfavorable condition of the money market, however, has prevented the financing of the project up to this time.

BOARD REPORTS.

Date.	Subject.	Personnel.
Mar. 6, 1921	Reconstruction of Orchard Mesa Irrigation District.	R. F. Walter, James Munn, J. R. Alexander, and S. O. Harper.
Mar. 8, 1921	Drainage of lands situated in the Palisade and Mesa County Irrigation Districts.	Do.

IRRIGATION DISTRICTS.

Considerable progress was made during the year in the matter of the rehabilitation of the Orchard Mesa Irrigation District and its inclusion as a unit of the Grand Valley project. The Secretary of the Interior on March 19, 1921, approved the undertaking of the reconstruction of the project, subject to the meeting of certain conditions by the district not later than August 1, 1921. At the end of the fiscal year satisfactory progress has been made by the district in reaching a basis of settlement of their outstanding indebtedness and in meeting the other conditions prerequisite to the undertaking of the project.

OPERATION AND MAINTENANCE.

The system under operation during the season of 1920 was practically the same as operated during the previous year, consisting of 55 miles of Main Canal and 150 miles of laterals. The irrigable area included in the 376 farms irrigated was 19,309 acres, of which 11,730 acres were actually irrigated. In addition to the project lands, water was also carried through the project system for 8,400 acres in the Palisade and Mesa County Irrigation Districts.

The beginning of the irrigation season was delayed until April 11 to permit the completion of the concrete lining job on the Main Canal above Tunnel No. 3. Water was turned out of the Main Canal at the end of the season on November 1. The total quantity of water delivered to project farms was 36,024 acre-feet, equivalent

to a duty of 3.1 acre-feet as compared with 3.8 acre-feet in 1919. This reduction was in part due to more careful use of water, due to the higher charge, and in part to the late wet spring, which lessened the requirement of water for early crops. A total of 33,740 acre-feet of water was delivered to irrigation districts.

No serious operation difficulties were experienced during the season and water was furnished to all farms on demand with very little interruption. The lining with concrete of the dangerous section of the Main Canal near Tunnel No. 3 ended the difficulty encountered at this point during the previous season. A break occurred in the Main Canal at the inlet of the East Salt Creek Siphon on April 15, which caused two days' interruption in water service below this point. A small break at the same place on June 21 caused one day's interruption. On July 1 the inlet of the Badger Wash Flume was undermined, necessitating an extension to the flume 40 feet in length which required about 10 days to complete. As this flume was located near the end of the canal and only a few water deliveries were affected, the inconvenience resulting was small. No serious difficulties were encountered in operating the lateral system, although the usual amount of trouble was experienced with Russian thistles which clogged the structures and interfered with uniform deliveries of water. A number of drops in the laterals washed out at different times, but difficulties of this nature were less than in previous years and most of the structures are now well puddled.

The principal maintenance jobs undertaken during the year were the construction of the extensions to the upper end of the Badger, Big Salt, and Mack Wash Flumes. Considerable work was also accomplished on resurfacing the piers at the diversion dam where the concrete had been damaged by frost. After the close of the irrigation season a large force of men and teams was employed on lateral cleaning and the favorable weather during November and December permitted excellent progress to be made on this work.

On account of the mild winter and lack of snowfall in the spring of 1921 there was a demand for water at a much earlier date than heretofore. Water was turned into the Main Canal on March 15 and deliveries for domestic use were made during the balance of the month. The farmers cooperated in burning weeds and cleaning the laterals to get the system in shape for use at this date. The system was operated during the season of 1921 to the end of the fiscal year with little difficulty, and satisfactory water service was maintained.

Historical review, Grand Valley project, by calendar years.

Item.	1916	1917	1918	1919	1920
Acreage for which Service is prepared to supply water	15,000	35,000	35,000	[1] 38,400	[1] 38,400
Acreage irrigated	1,741.5	5,289	8,102	[1] 18,449	[1] 19,484
Miles of canals operated	80	150.5	168	175	178
Water diverted (acre-feet)	30,813	55,891	74,352	[1] 133,364	[1] 142,527
Water delivered to land (acre-feet)	4,224	18,715	29,856	[2] 38,307	[2] 36,024
Per acre of land irrigated (acre-feet)	2.42	3.54	3.69	3.81	3.07

[1] Includes Palisade and Mesa County Irrigation Districts.
[2] Project lands only.

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 21.

SETTLEMENT.

No new lands were opened to settlement during the year. Four of the 10 farm units of leveled land opened under the order of February 28, 1920, were taken, leaving only 1 of these units available for entry at the end of the fiscal year. Five more farm units out of the 102 opened in March, 1918, were also filed on, leaving 7 of these units open to entry at the end of the year. There was a good demand for desirable land at the beginning of the fiscal year, but at the end, on account of the unfavorable outlook for farming, there was very little demand for project land. The action of the water users' association in levying an assessment of $2 per acre against all land whether water is used thereon or not has had a good effect in hastening the settlement and development of idle lands. In spite of the adverse conditions, fairly good progress was made in the general development of the project during the year. The population increased by approximately 200 and there was also a large increase in the number of live stock on the project farms.

There is no experiment farm on this project, but the county agent is available for consultation by the farmers. During the season of 1920 an attempt was made to secure an agricultural specialist to work among the project farmers and F. B. Headley, of the experiment farm on the Newlands project, spent several weeks on the project in August and September. His work was of considerable benefit in getting the farmers interested in securing more dairy stock for their farms. Agricultural experts from the State agricultural college visited the valley occasionally during the year and were available at all times for consultation on special matters.

Settlement data, Grand Valley project, by calendar years.

	1916	1917	1918	1919	1920
Total number of farms on project	900	900	900	900	900
Population	168	480	759	884	1,019
Number of irrigated farms	76	202	[1] 309	[1] 315	[1] 371
Operated by owners or managers	50	97	186	201	251
Operated by tenants	26	105	131	123	125
Population	168	480	759	884	1,019
Number of towns	[2] 6	[2] 6	[2] 6	[2] 6	[2] 6
Population	[2] 10,800	[2] 10,700	[2] 10,700	[2] 11,266	[2] 11,415
Total population in towns and on farms	[2] 10,968	[2] 11,180	[2] 11,459	[2] 12,150	[2] 12,434
Number of public schools	[2] 24	[2] 24	[2] 20	[2] 22	[2] 23
Number of churches	[2] 28	[2] 28	[2] 28	[2] 28	[2] 28
Number of banks	[2] 7	[2] 7	[2] 7	[2] 7	[2] 7
Total capital stock	$387,000	$411,000	$432,000	$432,000	$465,000
Total amount of deposits	[2] $2,484,761	[2] $2,525,675	[2] $3,030,621	[2] $3,743,000	[2] $3,743,000
Total number of depositors	[2] 7,260	[2] 7,462	[2] 8,681	[2] 10,042	[2] 10,150

[1] Include tracts fall plowed or worked without irrigation. These are included as farms operated by owners or tenants, but are not included in the number of farms listed as irrigated.
[2] These items include area adjacent to project.

PRINCIPAL CROPS.

The gross value of crops produced on the project during the season of 1920 was $525,360, an average of $48.80 per acre, as compared with $64 per acre for 1919. The cropped area was 10,760 acres, an increase of about 2,000 acres over the previous season. The falling off in crop yield is due primarily to the drop in prices of all farm products. The yield of nearly all crops was up to normal, with the exception of sugar beets, the returns from which were very disappointing on account of damage by curly leaf blight. The average yield amounted to only 5.9 tons per acre, not much more than half of the normal crop.

The total value of the sugar-beet crop was $152,000. Alfalfa was second with a value of $125,000, wheat third with $55,000, and oats, corn, apples, pears, and tomatoes were the other important crops in the order named. Had the sugar-beet crop been up to normal, the results for the season would have been fairly satisfactory, as the price received for this crop, $10 per ton, was proportionately better than for most of the other products. The combination, however, of poor yield and good prices for sugar beets and good yield and low prices for other products resulted in many of the farmers receiving insufficient returns to pay expenses. The majority of the farmers, however, although disappointed with their season's work, are by no means discouraged, and as most of them have only a small amount of capital invested in their farms, they are, as a rule, in better condition than farmers in other sections of the country where land values have been unduly inflated.

Crop report, Grand Valley project, Colorado, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	3,140	Ton	9,390	3.0	$13.40	$125,616	$40.10
Alfalfa seed	340	Bushel	1,142	3.4	9.75	11,131	32.85
Apples	217	Pound	1,146,150	5,300	.018	20,645	95.10
Beets, sugar	2,600	Ton	15,269	5.9	10.00	152,690	58.64
Beet tops	2,600					10,416	4.12
Corn, Indian	710	Bushel	15,875	22.4	1.26	20,012	28.25
Corn fodder	805	Ton	1,489	1.85	8.05	11,994	14.90
Garden	86					8,385	97.50
Hay	309	Ton	479	1.5	11.90	5,700	18.50
Oats	1,470	Bushel	43,410	29.5	.86	37,250	25.30
Pasture	900					6,750	7.50
Pears	80	Pound	474,600	5,900	.024	11,195	140.00
Potatoes	135	Bushel	10,557	78	.84	8,833	65.40
Wheat	1,477	do	31,000	21	1.78	55,215	37.50
Tomatoes	105	Ton	738	7	13.00	9,596	91.40
Straw	2,902	do	3,427	1.2	5.20	17,877	6.15
Miscellaneous	304					12,055	39.70
Less duplicated areas	7,420						
Total cropped	10,760	Total and average				525,360	48.80
Irrigated, no crop:							
Nonbearing orchard	50						
Young alfalfa	1,840						
Ground fall plowed	1,000						
Winter wheat	210						
Less duplicated areas	2,130						
Total irrigated	11,730						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	19,309	376	42.9
Total irrigated (under rental contracts)	11,730	371	26.1
Total cropped area farms reported	10,760	366	23.9

FINANCIAL STATEMENT.

Condensed financial statement, Grand Valley project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit		$443.88
Inventory of materials and supplies on hand		45,175.08
Plant and equipment in use		52,852.19
Current accounts receivable		10,453.99
Unearned value of contracts		2,125.00
Construction cost of works	$3,589,524.92	
Operation and maintenance during construction	266,187.43	
Gross construction cost	3,855,712.35	
Less revenues and adjustments during construction period	130,613.43	
Net construction cost		3,725,098.92
Investment items in transit		616.06
Total debits		3,386,795.12

CREDITS.

Current accounts payable		16,173.46
Contingent and deferred liabilities		2,568.88
Resources for repaying cost of project		156.63
Revenues held in reserve		184.00
Investment:		
Disbursements and transfers from other projects	$4,051,287.44	
Items in transit	590.06	
Total	4,051,877.50	
Less collections and transfers to other projects	$234,221.35	
Items in transit	[1] 56.00	
Total	234,165.35	
Net investment		3,817,712.15
Total credits		3,836,795.12

Construction cost and revenue, Grand Valley project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys, project	$55.87	$71,441.28
Pumping for irrigation, surveys		5,989.38
Canal system:		
Grand River diversion dam		500,466.93
Canyon division, headworks to Palisade	436.06	1,004,731.14
Division No. 2, Palisade to Indian Waste	[1] 152.09	531,010.61
Division No. 3, Indian Waste to Little Salt Wash	[1] 111.33	292,350.34
Division No. 4, Little Salt Wash to end	[1] 22.93	344,767.15
Total, canal system	149.71	2,673,326.17
Lateral system:		
District No. 1, Indian Waste to Big Salt Wash	3,777.70	141,677.97
District No. 2, Big Salt Wash to East Salt Creek	3,046.38	123,232.52
District No. 3, East Salt Creek to West Salt Creek	1,793.13	71,351.64
Total, lateral system	8,617.21	336,262.13
Drainage system:		
Project—		
Surveys	8,389.10	17,716.73
Drains	50,893.39	64,077.49
Grand Valley drainage district—		
Surveys and plans for complete system	6,461.70	31,815.28
Cooperative drainage in Grand Valley drainage district—		
Surveys	[1] 10,000.00	5,042.34
Drains	71,335.33	299,763.59
Total, drainage system	127,079.52	418,415.43
Flood protection: Protecting wasteway channels	203.22	15,877.77
Farm units: Survey of irrigable land	62.03	38,027.13

[1] Contra.

Construction cost and revenue, Grand Valley project—Continued.

Features.	Fiscal year 1921.	To June 30, 1921.
Permanent improvements:		
Permanent Camp No. 5	$218.45	$5,452.34
Permanent Camp No. 7	980.26	7,758.47
Ditch riders' quarters	209.81	4,438.23
Miscellaneous buildings	19.42	2,109.29
Total, permanent improvements	1,427.94	19,758.33
Telephone system	.....	11,794.30
Operation and maintenance during construction (water rentals):		
Project	68,822.53	260,363.01
Price-Stub	1,756.11	5,824.42
Total operation and maintenance during construction	70,578.64	266,187.43
Gross construction cost to June 30, 1921	208,174.14	3,855,712.35
Less revenues earned during construction period:		
Rentals of buildings	823.24	4,264.79
Rentals of irrigation water	29,092.33	84,175.78
Contractors' freight refunds	.61	8,118.15
Revenues, miscellaneous	1,471.74	2,688.60
Sales of Warren Act water	10,826.60	25,762.00
Profit on hospital operations	644.40	6,082.41
Losses on operations unclassified	4,254.22	[1] 478.30
Field cost adjustment	[1] 50.24	.....
Total revenues earned during construction period	47,062.90	130,613.43
Net construction cost of project to June 30, 1921	161,111.24	3,725,098.92

[1] Contra.

Statement of costs of construction and operation and maintenance, by calendar years, Grand Valley project.

	Construction.		
	Original.	Operation and maintenance. during.	Total.
Period prior to Dec. 31, 1911	$82,366.98	.....	$82,366.98
Year ending Dec. 31—			
1912	245,449.57	.....	245,449.57
1913	432,928.81	.....	432,928.81
1914	1,058,596.01	.....	1,058,596.01
1915	838,600.39	.....	838,600.39
1916	277,225.60	$19,458.25	296,683.85
1917	119,338.33	48,150.61	167,488.94
1918	146,721.84	47,525.32	194,247.16
1919	189,225.98	53,134.17	242,360.15
1920	133,394.55	65,643.81	199,038.36
Jan. 1 to June 30, 1921	65,676.86	32,275.27	97,952.13
Total	3,589,524.92	266,187.43	3,855,712.35

Statement of costs of construction and operation and maintenance, by fiscal years Grand Valley project.

	Construction.		
	Original.	Operation and maintenance during.	Total.
Period prior to June 30, 1912	$265,461.64	.....	$265,461.64
Year ending June 30—			
1913	188,772.93	.....	188,772.93
1914	668,889.51	.....	668,889.51
1915	1,357,472.93	.....	1,357,472.93
1916	324,814.92	$4,650.40	329,465.32
1917	226,436.03	29,305.01	255,741.04
1918	91,033.06	54,578.37	145,611.43
1919	210,642.06	57,070.07	267,712.13
1920	118,406.34	50,004.94	168,411.28
1921	137,595.50	70,578.64	208,174.14
Total	3,589,524.92	266,187.43	3,855,712.35

General expense, Grand Valley project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$2,669.42	$2,364.76	$5,034.18	$75,064.26	$11,018.61	$86,082.87
Project office	6,276.24	5,564.87	11,841.11	152,581.78	22,397.32	174,979.10
Denver office	1,167.80	1,035.75	2,203.55	12,406.24	1,821.10	14,227.34
District counsel's office	447.90	397.19	845.09	8,676.43	1,273.61	9,950.04
Other offices and miscellaneous	.....	.....	.....	23,527.35	3,453.56	26,980.91
Total	10,561.36	9,362.57	19,923.93	272,256.06	39,964.20	312,220.26
Percentage of general expense to gross cost	7.7	13.3	9.6	7.6	15.0	8.1

COLORADO, UNCOMPAHGRE PROJECT.

L. J. Foster, project manager, Montrose, Colo.

LOCATION.

Counties: Montrose and Delta.

Townships: 15 S., Rs. 94 to 96 W., sixth principal meridian; 48 to 51 N., Rs. 7 to 12 W., New Mexico principal meridian.

Railroad: Denver & Rio Grande.

Project towns and estimated population June 30, 1921: Montrose, 4,000; Olathe, 750; and Delta, 2,700.

WATER SUPPLY.

Sources of water supply: Gunnison and Uncompahgre Rivers.

Area of drainage basins: Gunnison River, 3,850 square miles; Uncompahgre River, 500 square miles.

Run-off in acre-feet, April to October, inclusive, Gunnison River at River Portal (3,850 square miles), 1905 to 1920: Maximum, 1,737,300; minimum, 844,550; mean, 1,334,100). Uncompahgre River at Colona, near Fort Crawford (500 square miles), 1903 to 1920: Maximum, 256,700; minimum, 128,700; mean, 172,500.

LANDS OPENED FOR IRRIGATION.

All lands irrigated from canals operated by the Reclamation Service were furnished water under rental contracts, except in a few instances where water was appurtenant to outstanding stock or deeds issued by canal companies whose properties had been transferred to the Government.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1921: Estimated at 100,000 acres.

Area under rental contracts, season of 1921: Estimated at 86,500 acres.

Length of irrigation season: From April 1 to October 31, 214 days, on all Government canals except the Loutsenhizer, under which the season ends November 15.

Average elevation of irrigable area: 5,500 feet above sea level.

Rainfall on irrigable area: 21-year average, 9.55 inches; 1920, at Montrose, 10.08 inches.

Average of highest recorded temperature for 10 years, 95° F.; average of lowest recorded temperature for 10 years, −13° F.

Character of soil of irrigable area: Red sandy gravel, adobe, and clay loam.

Principal products: Alfalfa, grain, fruits, sugar beets, potatoes, onions, and other vegetables.

Principal markets: Denver, Omaha, and Kansas City for live stock; Denver, Missouri River points, and Texas for fruit, potatoes, and onions; local mining camps for garden truck and small fruits.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in June, 1901.
Construction recommended by director March 7, 1903.
Construction conditionally authorized by Secretary March 14, 1903.
Construction authorized by Secretary June 7, 1904.
Contract for construction of Gunnison Tunnel approved October 18, 1904.
First irrigation by Reclamation Service, season of 1908.
Gunnison Tunnel completed for present use June, 1910.
Gunnison River diversion dam completed January, 1912.
Entire project 96.6 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan for the Uncompahgre project provides for the diversion of water from the canyon of the Gunnison River by means of a tunnel 6 miles long and a canal 11 miles long to supplement the flow of the Uncompahgre River, and in addition thereto the utilization of all waste, seepage, spring, percolating, and return water arising within the project, in the irrigation of lands within the Uncompahgre Valley. To distribute the waters of the Uncompahgre and Gunnison Rivers thus combined, seven other canal systems were constructed, all of which take water from the Uncompahgre River, except the West Canal, which can divert water from the South Canal by a flume over the Uncompahgre River or can divert from the Uncompahgre River by a feeder canal. The construction of the various canal systems included the purchase, enlargement, and extension of the more important private ditches acquired by the United States.

Surveys and diamond-drill investigations for Taylor Park Reservoir have been completed, but no construction work has been undertaken. The Gunnison Tunnel is complete. The South, West, Montrose & Delta, Loutsenhizer, Selig, Ironstone, East, and Garnet canal systems are complete except for the excavation, enlargement, and extension of a few small laterals and the installation of minor structures. Purchase has been made of over 88 per cent of the Loutsenhizer water rights and of shares pertaining to the Ironstone and Ironstone Extension Canals.

SUMMARY OF GENERAL DATA FOR UNCOMPAHGRE PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		100,000
Public land entered to June 30, 1921	21,684	
Public land open to entry on June 30, 1921	1,634	
Public land withdrawn on June 30, 1921	993	
Private land, June 30, 1921	75,689	
Acreage Service could have supplied in season of 1920		100,000
Estimated acreage Service can supply in season 1921		100,000
Estimated acreage Service can supply in season 1922		100,000
Acreage irrigated season 1920		64,180
Acreage cropped under irrigation season of 1920		63,730
Crops:		
Value of irrigated crops season of 1920		$3,397,500.00
Value of irrigated crops per acre cropped		53.30
Finances		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$174,000.00	
Miscellaneous collections and transfers issued	73,192.05	
Increase of compensation	18,802.46	
Total amount authorized		265,994.51
Encumbrances—		
Disbursements and transfers received	$157,413.91	
Current liabilities	15,169.61	
Contingent liabilities	2,951.87	
Increase of compensation	18,802.46	
Total encumbrances		194,337.85
Unencumbered balance on July 1, 1921		71,656.66
Fiscal year 1922—		
Amount specified in appropriation act		214,000.00
Fiscal year 1923—		
Proposed appropriation		235,000.00
Inventories:		
Value of stock on hand		26,166.50
Value of plant and equipment in use		21,868.14
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$7,701,310.87	
Less revenues and adjustments	1,070,830.00	
Net cost to June 30, 1921		6,630,480.87
Per cent completed on June 30, 1921	96.6	
Estimated per cent completed on June 30, 1922	98.3	
Estimated per cent completed on June 30, 1923	100.0	
Value of construction water-right contracts and other resources to repay net cost of project		76,718.68
Revenues held in reserve		82.00
Drainage:		
Total cost of drainage works to June 30, 1921		3,940.63
Estimated acreage damaged by seepage on June 30, 1921		16,000
No drainage work undertaken except for minor investigations.		

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected (cash).	Uncollected.
Rentals, irrigation water	$1,040,626.61	$950,187.43	$90,439.18
Contractors' freight refunds	2,698.68	2,690.07	8.61
Miscellaneous	23,246.10	23,018.41	227.69
Total	1,066,571.39	975,895.91	90,675.48

CONSTRUCTION DURING FISCAL YEAR.

Taylor Park Reservoir.—Hydrographic investigations were continued.

West Canal system.—The enlargement of the old West Canal feeder from the Uncompahgre River was completed by the drag line. Two timber drops were placed on the feeder ditch.

Montrose & Delta Canal system.—Two bridges, 1 check, 1 canal turnout, 4 farm turnouts, and 3 weirs, all timber structures, were completed.

Loutsenhizer Canal system.—The D. E. Lateral was completed. The following timber structures were placed on this lateral: Two bridges, 6 checks, 7 culverts, 14 drops, 1 canal turnout, 4 farm turnouts, and 1 wasteway. Two metal flumes were also placed.

Selig Canal system.—One bridge and 1 drop, both timber structures, were completed.

Ironstone Canal system.—Three bridges, 7 drops, 1 canal turnout, 4 farm turnouts, and 1 weir, all timber structures, were completed.

East Canal system.—One metal flume and 3 timber farm turnouts were completed.

SEEPAGE AND DRAINAGE.

Considerable areas in the Uncompahgre Valley are suffering from an excess of ground water, largely caused by excessive and careless use of irrigation water. This condition is no doubt aggravated by the system in use of furnishing water on a continuous-flow basis. Seeped areas contain excessive quantities of alkali and are not confined to the river bottoms or other low areas. About 9,000 acres have been drained in the valley. Some of this work was accomplished by individual farmers, but all the larger undertakings were carried through by drainage contractors. The cost of drainage varies from $25 to $75 per acre, depending upon the distance the tile has to be carried to secure an outlet.

Preliminary drainage surveys were begun during the spring of 1915, but no drainage construction has been undertaken by the Service.

OPERATION AND MAINTENANCE.

During the season of 1920 the Service supplied and distributed water for the irrigation of 64,180 acres of land, of which 5,264 acres were supplied from the South Canal system, 4,983 acres from the West Canal system, 21,801 acres from the Montrose & Delta Canal system, 5,181 acres from the Loutsenhizer Canal system, 6,354 acres from the Selig Canal system, 13,540 acres from the Ironstone Canal system, 5,420 acres from the East Canal system, and 1,637 acres from the

Garnet Canal system. The North Mesa Canal, the owners of which have entered into an agreement to transfer it to the United States, was supplied with Gunnison water. Gunnison water was also rented to the Ouray Ditch Co. and to the Logan Ditch Co.

During the season 429,820 acre-feet of water were diverted into the canals operated by the Service, of which 365,853 acre-feet were delivered to the land. All water was delivered on a continuous-flow rental basis. The charge was $105 per second-foot for the season for all consumers under all canal systems except as noted below: The consumers under the Loutsenhizer, Selig, and East Canal systems possessing water rights in the old Loutsenhizer Canal were furnished water at the rate of $20 per second-foot for Uncompahgre priority water and $85 additional per second-foot for supplemental water. A few consumers under the Montrose & Delta Canal system were furnished Uncompahgre priority water at rates varying from $36 to $40 per second-foot, depending upon the terms of the contracts they held with the Montrose & Delta Canal Co. at the time of its purchase by the Government. Water appurtenant to the stock of the Ironstone Canal system was carried for $5 per share; Ironstone Extension stock for $3 per share; Delta Chief stock for $2 per share; Home Run stock for $1.50 per share; and Chipeta stock for 25 cents per share. Water was furnished to the city of Montrose at the rate of $1.60 per acre-foot. Private canals were furnished Gunnison water at the South Canal outlet at the rate of $80 per second-foot for the season. Water was diverted into the Chipeta-Beaudry Ditch from the Garnet Canal, under informal contract, for $105 for the season. The rental rates in effect for the season of 1921 were the same as those for the season of 1920, with the exception that the Secretary of the Interior granted a deferred-payment plan on account of the financial depression. Under this plan one-half the charge is due from each water user on July 1 and October 1, respectively, with interest at 5 per cent per annum from April 1, 1921. The terms also provide for the payment of a penalty of 1 per cent each month if the charges remain unpaid after the due date. Water users had the option of making cash payments prior to May 31, 1921, without any interest charges.

Extensive repairs were made to the South Canal lining during the winter. Approximately 600 cubic yards of concrete were placed in the floor of the Seven Drops section, in the floor and side walls of the cut below Tunnel No. 3, and in the floor and side walls above Tunnel No. 1. Miscellaneous small repairs were made to the lining throughout the season.

The concrete pier of the steel girder flume at the West Canal headworks, which was undermined during the spring of 1920, was carried to an additional depth of 6 feet, 25 cubic yards of concrete being placed.

Some repairs were necessary to the sliding bank section of the Montrose & Delta Canal banks. Considerable slide material along the Montrose & Delta Canal in the Happy Canon and Duckett Basin region was removed by the drag line.

The old wood flume of the Montrose & Delta Canal across Dry Creek was replaced, approximately 17,000 feet b. m. of lumber being required.

The Ironstone slide near milepost 1 was removed by the P. & H. drag line in January and February; approximately 6,000 cubic yards were excavated. The washed-in gravel below the headworks was also excavated, 450 cubic yards being removed.

Several breaks of minor character occurred on the various canal systems, which were repaired without interfering with the delivery of water.

Routine maintenance work consisted of brushing canal banks, removing weeds after windstorms, spading banks, removing gravel near headworks of canals, protecting headworks during high water, repairing and raising banks, and replacing structures.

The peak flood stage of the Uncompahgre River was reached during the period from June 10 to June 18, inclusive. On June 15 the river carried twice as much as that reported during any past known flood. The project headgates out of the river suffered little, considering the confined channel of the river. The rating station at Colona was washed out.

The West Canal system was damaged as a result of part of the river cutting in above the Boomer Feeder headgate, breaching the main line at two points on the side-hill section. Repairs were made by the drag line and a full head turned back into the canal on the 26th after a 10-day shutdown.

The concrete apron overflow and the sheet piling below the protective works at the river intake of the Montrose & Delta Canal system was damaged considerably, but the temporary repair work was accomplished without causing any shutdown in the operation of the main canal.

Little damage was caused at the headgates of the Chipeta, Loutsenhizer, East, and Garnet Canals, and at no time was any difficulty experienced in maintaining a full head of water in these canals.

Considerable damage was done to the sheet piling at the protective works for the Selig Canal headgate. A breach was made through 100 feet of piling, and it was necessary to turn the river back into its old channel by means of a rock basket wall. A full head was turned back into this canal on June 20 after a 4-day shutdown.

Comparatively little damage was done to the Ironstone Canal, although part of the river cut in above the headworks in a manner similar to that experienced on the West Canal system. The canal capacity was nearly sufficient to take care of the entire overflow after the canal was breached in the bottom land section, and as a result a maximum head was maintained in the canal without experiencing any shutdowns.

Historical review, Uncompahgre project, by calendar years.

Item.	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	77,713	90,000	100,000	100,000	100,000
Acreage irrigated	49,273	53,108	58,270	60,906	64,180
Miles of canal operated	406.45	415	413	442	448
Water diverted (acre-feet)	329,564	368,148	423,050	420,176	429,820
Water delivered to land (acre-feet)	299,432	316,365	367,144	390,770	365,853
Per acre of land irrigated (acre-feet)	6.08	5.96	6.30	6.42	5.70

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 21.

SETTLEMENT.

Seven new units were opened on the project during the year. Eleven farm units were taken up, and 43 now remain vacant. Several units were amended by adding to their irrigable acreage.

H. A. Ireland, project agricultural advisor, in cooperation with the county agents of Montrose and Delta Counties and specialists from the extension service of the State agricultural college, has continued his various activities in forming wool pools, securing production records of dairy herds, etc. The boys' and girls' clubs organized now have about 250 members, practically all on the project.

There is no experimental station on the project, but the State experiment station at Fort Collins is accessible to project farmers. The Denver & Rio Grande Railway Co. also maintains an agricultural department, with free service to farmers in its territory, and the State bureau of markets has given valuable service in the marketing of farm products.

Settlement data, Uncompahgre project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	1,320	1,402	1,514	1,526	1,588
Population	4,403	4,613	5,279	5,471	6,015
Number of irrigated farms	1,320	1,402	1,514	1,526	1,588
Operated by owners or managers	713	809	949	1,012	1,077
Operated by tenants	607	593	565	514	511
Population	4,403	4,613	5,279	5,471	6,015
Number of towns	3	3	3	3	3
Population	6,700	6,950	6,950	6,950	7,450
Total population in towns and farms	11,103	11,563	12,229	12,421	13,465
Number of public schools	26	26	26	27	27
Number of churches	27	27	27	27	27
Number of banks	8	8	8	8	8
Total capital stock	$360,000	$515,700	$588,800	$594,025	$621,763
Amount of deposits	$2,750,000	$4,858,903	$4,484,626	$5,550,465	$4,925,150
Number of depositors	8,100	9,500	10,000	11,000	11,000

PRINCIPAL CROPS.

The season of 1920 was in general favorable for all crops except sugar beets, which were retarded by heavy rains baking the ground before the beets were up. The per acre yield of beets fell to 7.4 tons. Other principal crops produced yields slightly above normal. The fruit crops were especially heavy and with fair prices offset to a considerable extent the low prices for other crops. The average crop value per acre was $53.30, as compared with $56.76 in 1919.

Crop report, Uncompahgre project, Colorado, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Average per unit of yield.	Total.	Average per acre.
Alfalfa hay	25,520	Ton	82,737	3.2	$9.93	$821,580	$32.19
Alfalfa seed	817	Bushel	1,893	2.3	11.77	22,270	27.27
Apples	1,830	Pound	19,816,060	10,828.4	.0177	352,372	192.55
Barley	184	Bushel	4,118	22.4	1.23	5,065	27.53
Beans	301	...do	2,969	9.9	3.27	9,704	32.25
Beets (sugar)	4,800	Ton	35,373	7.4	11.00	389,103	81.07
Clover hay	101	...do	128	1.3	8.20	1,050	10.38
Clover seed	151	Bushel	343	2.3	13.35	4,581	30.34
Corn (Indian)	2,281	...do	72,737	31.9	1.01	73,507	32.23
Corn fodder	120	Ton	583	4.9	4.70	2,738	22.82
Corn ensilage	313	...do	1,935	6.2	8.26	15,992	51.09
Fruits, small	47	Pound	74,633	1,588.0	.18	13,434	285.83
Garden	291					31,462	108.11
Hay	432	Ton	613	1.4	8.52	5,222	12.09
Oats	5,878	Bushel	204,366	34.8	.72	146,530	24.93
Onions	433	...do	122,862	283.7	.55	67,475	155.83
Pasture	7,501					38,607	5.15
Peaches	79	Pound	774,120	9,798.9	.026	20,141	254.95
Pears	7	...do	78,880	11,268.6	.0246	1,940	277.13
Peas	1	Bushel	20	20.0	1.50	30	30.00
Prunes	3	Pound	4,050	1,350.0	.07	283	94.33
Potatoes, white	6,166	Bushel	1,397,266	226.6	.624	872,000	141.42
Rye	12	...do	108	9.0	1.25	135	11.25
Wheat	10,810	...do	320,754	29.7	1.55	496,250	45.92
Miscellaneous	123					6,029	49.02
Less duplicated areas	4,471						
Total cropped	63,730	Total and average				3,397,500	53.30
Irrigated, no crop:							
Nonbearing orchard	84						
Young alfalfa	2,067						
Ground, fall plowed	3,540						
Miscellaneous	99						
Less duplicated areas	5,340						
Total irrigated	64,180						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area of farms reported	84,460	1,588	84
Total irrigated area of farms reported	64,180	1,588	64
Irrigated under rental contracts	64,180	1,588	64
Total cropped area of farms reported	63,730	1,588	64

PUBLIC NOTICES AND ORDERS.

ORDER. JULY 19, 1920.

1. **Public lands for which entry may be made and water is available.**—In pursuance of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly sections 1, 10, and 11 of the reclamation extension act of August 13, 1914 (38 Stat., 686), it is announced that water is available, as hereinafter specified, and entry may be made in accordance with the terms and conditions imposed by this order on farm unit "W," E. ½ SE. ¼ sec. 32, and W. ½ SW. ¼ sec. 33, T. 15 S., R. 96 W., sixth principal meridian, containing 76 irrigable acres. A diagram showing said farm unit, which is amendatory of a township plat approved February 20, 1918, was approved by the department on the date of this order, and is on file in the office of the project manager, United States Reclamation Service, Montrose, Colo., and at the local land office, Montrose, Colo.

2. **Special conditions of opening and allowance of entry.**—The opening of said farm unit and the allowance of entry thereon under this order is upon the express condition that the entryman shall

take the water available for the farm unit entered by him at any suitable point which he may select on the F. N. B. lateral of the Ironstone Canal system of the Uncompahgre Valley project, Colorado, and at his own sole cost and expense construct, operate, and maintain a siphon and other irrigation works necessary for carrying the water from said point of delivery to his entry. A further condition of the allowance of entry is that the applicant shall within one year from the date of his entry construct the siphon and other irrigation works necessary for carrying the water from said point of delivery to his entry, and upon failure so to do within said year the Secretary of the Interior may at his option cancel his entry with all rights acquired thereunder.

3. **When and how to make entry for public land.**—Homestead entry for the farm unit shown on said plat may be made beginning August 12, 1920, at 9 o'clock a. m. at the said local land office. Every person desiring to acquire said farm unit must execute a homestead application subject to the provisions of the reclamation law in manner required by law, which, with the required fees and commissions, accompanied by certificate of the project manager as to the filing of application for rental of water and payment of water-rental charges as hereinafter provided, may be presented to said local land office, in person, by mail, or otherwise, within a period of six days prior to the opening, to wit: On and from August 6, 1920, to and including 9 o'clock a. m. August 12, 1920. Applications presented after said period of six days will be filed and noted in the order of their receipt. Any applications not based on a prior settlement right will be subject to valid settlement claims asserted in the manner required by law.

4. **Simultaneous filings for public lands.**—Applications reaching said local land office during said period of six days will be held and treated as simultaneously filed, and the register and receiver will dispose of them as follows:

(*a*) Where there is no conflict the application will be allowed.

(*b*) Where there are conflicting homestead applications the register and receiver will write on cards the names of the several applicants, and each of these cards will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., on the date of opening to entry, if practicable (if not, at the same hour one day later), after all the envelopes containing the names of the several applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the applications of the respective persons, and the applications will be allowed in such order. Applications conflicting in whole with those previously allowed will be rejected in the usual manner.

5. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain land applied for by him he will be permitted to withdraw his original application without prejudice. In the event of such withdrawal the fees and commissions will be returned by the receiver, and the water-rental charges deposited will be returned by the project manager, upon surrender of the certificates of filing issued by the project manager.

6. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under

any settlement or occupation of any of said public land, begun without having at the time a valid approved water-rental application covering the land in question: *Provided, however*, That this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

7. **Limit of area for which entry may be made.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such land, is fixed as shown upon the plat for the said farm unit.

8. **Application for water rental.**—All water-rental applications must be made to the project manager, United States Reclamation Service, Montrose, Colo. Applications may be made on or after the date hereof upon forms provided for that purpose and must be accompanied by a payment of $3 per acre for each irrigable acre contained in the farm unit. Each water-rental application must be for said farm unit, and more than one person may make such application for the same. A certificate of filing will be issued each applicant by the project manager. Filing of water-rental application and issuance of certificate give no preference right to entry on public lands. Only when the project manager is notified by the local land office that an entry has been allowed will acceptance of the water-rental application be indorsed thereon. Whereupon all other water-rental applications affecting the farm unit in question with payments made will be returned to the respective applicants upon surrender by them of the certificates of filing issued by the project manager.

9. **Water-rental charge.**—The initial payment of $3 per irrigable acre will be credited as payment of a minimum charge of $1 per acre for each of three successive years beginning with the year in which the entry is made, payment of which amount will entitle the entryman to one dollar's worth of water each of said years, at the rates fixed in the regulations of the Secretary of the Interior for similar lands on the project: *Provided*, That when lands have been or hereafter are entered after June 15 of any year, and therefore do not secure the benefits of water for irrigation purposes in that year, the payment of the $3, made at the time of entry, will be applied as a credit to the minimum water-rental charges, or the minimum operation and maintenance charges for the three-year period beginning with the year following that in which entry was made, in accordance with the minimum charges which have been or hereafter may be established by the Secretary of the Interior for similar lands on the project. Additional water will be furnished at the same rate as established for water deliveries to other lands in the project. The charges herein provided will be made against each acre of irrigable land in the farm unit whether water is used thereon or not, and no part of the initial payment of $3 per irrigable acre will be refunded at the termination of the three-year period. Future charges will be announced by further order or by public notice. Said minimum water-rental charge of $3 per irrigable acre will be required to be deposited in advance by the prospective entryman upon executing water-rental application before making application for entry in accordance with the terms of this order.

10. **Water users' association.**—The successful applicant after making homestead application will be required to subscribe the land embraced in his farm unit to the Uncompahgre Valley Water Users' Association.

11. **Water-right application under public notice.**—Within three months after date of public notice hereafter to be issued, for the lands described in said farm unit plat, the entryman must make a formal water-right application covering his farm unit, in accordance with the terms of this order and such notice and the last proviso of section 1 of said reclamation extension act. Upon failure so to do the Secretary of the Interior may at his option cancel the entry in question with all rights acquired thereunder.

12. **Preference rights to soldiers.**—Until October 12, 1920, water-rental applications and applications to make homestead entry hereunder shall be received only from officers, soldiers, sailors, or marines who have served in the Army or Navy of the United States in the war with Germany and have been honorably separated or discharged therefrom or placed in the Regular Army or Naval Reserve; provided, however, that they must be qualified to make entry under the homestead laws.

13. **Proof to be furnished by soldiers.**—Every person, qualified under the terms of the first preceding paragraph, who desires to make entry, must file with his water-rental application his affidavit, which shall state his time of service, the unit of which he was a member, the date on which he was honorably discharged or separated or transferred to the Regular Army or Naval Reserve, and that he did not refuse to wear the uniform of such service nor to perform the duties thereof. There shall be attached to said affidavit a copy of such honorable discharge or separation from the service, or the order of transfer to the Regular Army or Naval Reserve, as the case may be, which copy shall be certified by a notary public to be a true copy of the original.

14. **General entry.**—On and after October 12, 1920, the lands described herein if the same remain unentered shall be subject to entry under this order by any person having the general qualifications of a homestead entryman. If on October 12, 1920, prior to 2 p. m. more than one water-rental application shall be filed for this farm unit, then the right to make entry for such unit shall be determined at 2 p. m. of that day in accordance with the provisions of paragraph 4 of this order.

S. G. Hopkins,
Acting Secretary of the Interior.

ORDER, APRIL 9, 1921.

1. **Public lands for which entry may be made and water is available.**—In pursuance of the act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly sections 1, 10, and 11 of the extension act of August 13, 1914 (38 Stat., 686), it is announced that water is available and entry may

be made in accordance with this order on the following-described farm units, on the Uncompahgre Valley Project, Colorado, to wit:

Farm unit.	Description.	Acres irrigable.
A	Lots 2, 3, and 4, sec. 7, T. 51 N., R. 9 W., New Mexico principal meridian	53
E	Lots 1, 2, and 5, sec. 12, T. 51 N., R. 10 W., New Mexico principal meridian	94
C	Lot 3, sec. 8, and NE. ¼ NW. ¼ sec. 17, T. 51 N., R. 11 W., New Mexico principal meridian	50
M	SE. ¼ SW. ¼ sec. 30, NE. ¼ NW. ¼ and W. ½ NE. ¼ sec. 31, T. 51 N., R. 11 W., New Mexico principal meridian.	70
M	N. ½ NE. ¼ and SW. ¼ NE. ¼ sec. 28, T. 15 S., R. 94 W., sixth principal meridian	54
C	W. ½ SW. ¼ sec. 32, T. 15 S., R. 94 W., sixth principal meridian	62

Diagrams showing the above-described farm units were approved by the department on the date of this order, and are on file in the office of the project manager, United States Reclamation Service, Montrose, Colo., and at the local land office, Montrose, Colo.

2. **When and how to make entry for public land.**—Subject to the provisions hereof and particularly to the soldiers' preference right referred to in paragraphs 11 and 12, homestead entries for the farm units shown on said plats may be made beginning May 6, 1921, at 9 o'clock a. m., at the said local land office. Every person desiring to acquire any of said public lands must execute a homestead application subject to the provisions of the reclamation law in manner required by law, which, with the required fees and commissions, accompanied by certificate of the project manager as to the filing of application for rental of water and payment of water-rental charges as hereinafter provided, may be presented to said local land office in person, by mail, or otherwise, within a period of six days prior to the opening, to wit: On and from April 30, 1921, to an including 9 o'clock a. m., May 6, 1921. Applications presented after said period of six days will be filed and noted in the order of their receipt. Any applications not based on a prior settlement right will be subject to valid settlement claims asserted in the manner required by law.

3. **Simultaneous filings for public lands.**—Applications reaching said local land office during said period of six days will be held and treated as simultaneously filed, and the register and receiver will dispose of them as follows:

(*a*) Where there is no conflict the application will be allowed.

(*b*) Where there are conflicting homestead applications the register and receiver will write on cards the names of the several applicants, and each of these cards will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., on the date of opening to entry, if practicable (if not, at the same hour one day later), after all the envelopes containing the names of the several applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the applications of the respective persons and the applications will be allowed in such order. Applications conflicting in whole with those previously allowed will be rejected in the usual manner.

4. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain land applied for by him he will be permitted to elect whether he will amend his application to embrace

other lands not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the fees and commissions will be returned by the receiver, and the water-rental charges deposited will be returned by the project manager, upon surrender of the certificate of filing issued by the project manager.

5. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands, begun at or prior to 9 a. m., May 6, 1921; provided, however, that this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

6. **Limit of area for which entry may be made.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands is fixed as shown upon the plats for the several farm units.

7. **Application for water rental.**—All water-rental applications must be made to the project manager, United States Reclamation Service, Montrose, Colo. Applications may be made on or after the date hereof upon forms provided for that purpose and must be accompanied by a payment of $3 per acre for each irrigable acre contained in the farm unit. Each water-rental application must be for a specified farm unit, and more than one person may make such application for the same farm unit. A certificate of filing will be issued each applicant by the project manager. Filing of water-rental application and issuance of certificate give no preference right to entry on public lands. Only when the project manager is notified by the local land office that an entry has been allowed will acceptance of the water-rental application be indorsed thereon. Whereupon all other water-rental applications affecting the farm unit in question, with payments made, will be returned to the respective applicants upon surrender by them of the certificate of filing issued by the project manager.

8. **Water-rental charge.**—The initial payment of $3 per irrigable acre will be credited as payment of a minimum charge of $1 per acre for each of three successive years beginning with the year in which entry is made, payment of which amount will entitle the entryman to one dollar's worth of water each of said years, at the rates fixed in the regulations of the Secretary of the Interior for similar lands on the project: *Provided,* That when lands have been or hereafter are entered after June 15 of any year, and therefore do not secure the benefits of water for irrigation purposes in that year, the payment of the $3, made at the time of entry, will be applied as a credit to the minimum water-rental charges, or the minimum operation and maintenance charges, for the 3-year period beginning with the year following that in which entry is made, in accordance with the minimum charges which have been or hereafter may be established by the Secretary of the Interior for similar lands on the project. Additional water will be furnished at the same rate as established for water deliveries to other lands in the project. The charges herein provided will be made against each acre of irrigable land in the farm unit whether

water is used thereon or not, and no part of the initial payment of $3 per irrigable acre will be refunded at the termination of the 3-year period. Future charges will be announced by further order or by public notice. Said minimum water-rental charge of $3 per irrigable acre will be required to be deposited in advance by the prospective entryman upon executing water-rental application before making application for entry in accordance with the terms of this order.

9. **Water users' association.**—The successful applicant after making homestead application will be required to subscribe the land embraced in his farm unit to the Uncompahgre Valley Users' Association.

10. **Water-right application under public notice.**—Within three months after date of public notice, hereafter to be issued for the lands described in said farm-unit plats, each entryman must make a formal water-right application covering his farm unit, in accordance with the terms of this order and such notice and the last proviso of section 1 of said reclamation extension act. Upon failure so to do the Secretary of the Interior may, at his option, cancel the entry in question with all rights acquired thereunder.

11. **Preference rights to soldiers.**—Until July 6, 1921, water-rental applications and applications to make homestead entry hereunder shall be received only from officers, soldiers, sailors, or marines who have served in the Army or Navy of the United States in the war with Germany and have been honorably separated or discharged therefrom or placed in the Regular Army or Naval Reserve: *Provided, however,* That they must be qualified to make entry under the homestead laws.

12. **Proof to be furnished by soldiers.**—Every person, qualified under the terms of the first preceding paragraph, who desires to make entry must file with his water-rental application his affidavit, which shall state his time of service, the unit of which he was a member, the date on which he was honorably discharged or separated or transferred to the Regular Army or Naval Reserve, and that he did not refuse to wear the uniform of such service nor to perform the duties thereof. There shall be attached to said affidavit a copy of such honorable discharge or separation from the service, or the order of transfer to the Regular Army or Naval Reserve, as the case may be, which copy shall be certified by a notary public to be a true copy of the original.

13. **General entry.**—On and after July 6, 1921, any lands described herein which remain unentered shall be subject to entry under this order by any person having the general qualifications of a homestead entryman. If on July 6, 1921, prior to 2 p. m. more than one water-rental application shall be filed for any one farm unit, then the right to make entry for any such unit shall be determined at 2 p. m. of that day in accordance with the provisions of paragraph 3 of this order.

E. C. Finney,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Uncompahgre project, June 30, 1921.

DEBITS.

Inventory of materials and supplies on hand		$26,166.50
Plant and equipment in use		21,868.14
Current accounts receivable		90,675.48
Construction charges not due		6,656.00
Unearned value of contracts		1,951.87
Construction cost of works	$6,416,802.23	
Operation and maintenance during construction	1,284,609.98	
Unadjusted clearing accounts	[1] 101.34	
Gross construction cost	7,701,310.87	
Less revenues and adjustments during construction period	1,070,830.00	
Net construction cost		6,630,480.87
Items in transit		730.93
Total debits		6,778,529.79

CREDITS.

Current accounts payable		40,670.92
Contingent and deferred liabilities		1,951.87
Resources for repaying cost of project		76,718.68
Revenues held in reserve		82.00
Investment:		
Disbursements and transfers from other projects	$7,872,701.39	
Items in transit	730.93	
Total	7,873,432.32	
Less collections and transfers to other projects	1,214,326.00	
Net investment		6,659,106.32
Total credits		6,778,529.79

Construction cost and revenue, Uncompahgre project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys		$96,541.76
Storage investigations (Taylor Park Dam)		12,698.92
Canal system:		
Gunnison River weir and headworks		121,233.37
Gunnison Tunnel	[1] $8,988.28	3,038,895.52
South Canal		871,308.20
Total, canal system	[1] 8,988.28	4,031,437.09
Lateral system:		
South	212.23	66,160.46
West	2,060.30	273,840.58
Montrose and Delta	2,424.88	563,954.08
Loutsenhizer	11,025.71	151,068.71
Selig	418.10	352,418.04
Ironstone	3,832.92	451,091.52
East	1,653.80	267,405.33
Garnet		5,569.44
Preliminary estimates, sublaterals		202.65
Total, lateral system	21,627.94	2,131,710.81
Drainage investigations		3,940.63
Power system—preliminary work		273.85
Farm units	93.57	36,186.77
Unadjusted clearing accounts	[1] 101.34	[1] 101.34
Permanent improvements, land and buildings		28,661.24
Telephone system		6,788.48
Operation and maintenance during construction (water-rental basis)	163,622.79	1,284,609.98
Subtotal	176,254.68	7,632,748.19
Value of work performed by others	68,562.68	68,562.68
Gross construction cost	244,817.36	7,701,310.87
Less revenues earned during construction period:		
Rentals of buildings	888.09	21,883.69
Rentals of irrigation water	150,382.38	1,040,626.61
Contractor's freight refunds	8.61	2,698.68
Other revenues, unclassified	768.21	1,362.41
Profits on hospital operations	829.44	4,258.61
	152,876.73	1,070,830.00
Net construction cost to June 30, 1921	91,940.63	6,630,480.87

[1] Contra.

Cost by calendar years, Uncompahgre project.

	Construction.		
	Original.	Operation and maintenance during.	Total.
Year ending Dec. 31—			
1904	$66,088.02	.....	$66,088.02
1905	623,904.17	.....	623,904.17
1906	1,199,879.82	.....	1,199,879.82
1907	904,910.39	.....	904,910.39
1908	541,230.15	$7,723.63	548,953.78
1909	594,384.50	21,331.50	615,716.00
1910	414,994.51	45,621.97	460,616.48
1911	274,704.21	47,156.30	321,860.51
1912	279,060.25	71,197.61	350,257.86
1913	267,755.55	104,523.62	372,279.17
1914	295,499.72	71,089.73	366,589.45
1915	301,819.68	89,569.33	391,389.01
1916	283,855.19	89,997.26	373,852.45
1917	160,204.77	165,083.88	325,288.65
1918	134,468.09	195,293.84	329,761.93
1919	13,288.23	131,351.88	144,640.11
1920	59,766.40	155,393.13	215,159.53
Jan. 1 to June 30, 1921	887.24	89,276.30	90,163.54
Total	6,416,700.89	1,284,609.98	7,701,310.87

Cost by fiscal years, Uncompahgre project.

	Construction.		
	Original.	Operation and maintenance during.	Total.
Year ending June 30—			
1905	$131,304.58	.....	$131,304.58
1906	1,130,248.77	.....	1,130,248.77
1907	1,118,883.07	.....	1,118,883.07
1908	610,901.02	$1,740.71	612,641.73
1909	664,653.48	17,504.38	682,157.86
1910	567,272.09	21,148.27	588,420.36
1911	253,221.37	59,804.71	313,026.08
1912	307,552.80	62,056.19	369,608.99
1913	197,088.86	83,920.94	281,009.80
1914	298,128.54	87,665.42	385,793.96
1915	383,917.56	72,820.40	456,737.96
1916	310,332.20	98,886.07	409,218.27
1917	190,996.08	113,099.66	304,095.74
1918	147,393.37	220,396.64	367,790.01
1919	45,412.02	133,451.92	178,863.94
1920	[1] 21,799.49	148,491.88	126,692.39
1921	81,194.57	163,622.79	244,817.36
Total	6,416,700.89	1,284,609.98	7,701,310.87

[1] Contra.

General expense, Uncompahgre project.

	Fiscal year 1921.			To June 30, 1921		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$252.86	$4,303.42	$4,556.28	$112,910.18	$23,195.29	$136,105.47
Project office	859.45	14,619.27	15,478.72	379,124.51	94,384.45	473,508.96
Denver office	120.00	2,041.41	2,161.41	43,540.73	11,862.97	55,403.70
District counsel's office	93.75	1,595.67	1,689.42	11,748.59	5,612.37	17,360.96
Other offices and miscellaneous	.....	.....	.....	46,688.56	8,045.09	54,733.65
Total	1,326.06	22,559.77	23,885.83	594,012.57	143,100.17	737,112.74
Percentage of general expense to gross cost	1.6	13.8	13.5	9.4	11.1	9.7

NOTE.—Construction percentages computed on cost, including $68,562.68 "Work performed by others."

IDAHO, BOISE PROJECT.

J. B. Bond, project manager, Boise, Idaho.

LOCATION.

Counties: Ada, Boise, Canyon, Elmore, Idaho, and Malheur, Oreg.

Townships: 1 S. to 5 N., Rs. 6 W. to 6 E., Boise meridian, and Tps. 21 and 22 S., R. 46 E., Willamette meridian.

Railroads: Oregon Short Line, Boise, Nampa & Owyhee and Idaho Northern (now branches of Oregon Short Line); Idaho Traction; Caldwell Traction; and Intermountain.

Project cities and towns and estimated population June 30, 1921: Boise, 21,400; Nampa, 7,630; Caldwell, 5,110; Meridian, 1,000; Kuna, 370; Wilder, 350; Bowmont, 70; Melba, 240; Huston, 100; Notus, 150.

WATER SUPPLY.

Source of water supply: Boise River.

Area of drainage basin: 2,610 square miles.

Annual run-off in acre-feet of Boise River near Highland (2,610 square miles), 1895 to 1920: Maximum, 3,300,000; minimum, 1,119,530; mean, 2,163,661.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1921: 281,798 acres, including 130,440 acres of vested water-right lands.

Area under water-right applications and rental contracts, season of 1921: 149,558 acres.

Area under special contracts: 130,440 acres.

Length of irrigation season: April 5 to October 5, 184 days.

Average elevation of irrigable area: 2,500 feet above sea level.

Rainfall on irrigable area: At Boise station for 57 years, average 13.73 inches; 1920, 13.53 inches.

Average highest recorded temperature for 22 years, 102° F.; average lowest recorded temperature for 22 years, 2° F.

Character of soil of irrigable area: Clayey loam, light sandy loam, and sandy loam.

Principal products: Alfalfa, wheat, oats, clover, potatoes, apples, prunes, and small fruits.

Principal markets: Boise, Nampa, Caldwell, Meridian, Idaho; Portland, Oreg.; and eastern cities.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: July 2, 1917; April 1, 1918; March 7, March 8, 1919; February 21, 1920; February 15, February 18, 1921.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.

Construction recommended by board of engineers February 15, 1905.

Construction authorized by Secretary March 27, 1905.

Main canals of New York Canal Co and Idaho-Iowa Lateral & Reservoir Co. acquired March 3, 1906.

First irrigation by Reclamation Service, season of 1906.

Boise River Dam completed September, 1908.

Upper Deer Flat embankment completed March, 1911.

Deer Flat Forest embankment completed June, 1911.

Lower Deer Flat embankment completed January, 1912.

Boise River power plant completed May, 1912.

Arrowrock Dam completed November, 1915.

Pioneer district drainage completed June, 1916.

Nampa and Meridian district drainage completed August, 1917.

Notus Canal Division completed June 15, 1921.

Project 99 per cent completed June 30, 1921 (not including extensions).

IRRIGATION PLAN.

The irrigation plan of the Boise project provides for storage of water in the Arrowrock Reservoir on Boise River, about 22 miles above Boise, and in the Deer Flat Reservoir near Caldwell and Nampa, Idaho; the diversion of water from Boise River by the Boise River Dam, about 8 miles above Boise; the distribution of water on the south side of Boise River, through the Main Canal, leading from the dam to the Deer Flat Reservoir; distributing laterals heading in the Main Canal; distributing canals heading in the Deer Flat Reservoir; and distributing canal systems heading in the Boise River below the Boise River Dam; and the distribution of water on the north side of the Boise River to a small area of land east of Boise through a canal system heading in the Boise River Dam. Water is diverted from two large drains in the Pioneer Irrigation District and carried through a gravity canal across the Boise River near Caldwell to supply 6,500 acres in the Notus Canal Division. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

SUMMARY OF GENERAL DATA FOR BOISE PROJECT, TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		[1] 329,803
Public land entered to June 30, 1921	67,468	
Public land withdrawn on June 30, 1921	3,160	
State land unsold, June 30, 1921	1,859	
Private land, June 30, 1921	257,316	
Acreage Service could have supplied in season of 1920		[2] 274,379
Estimated acreage Service can supply in season of 1921		281,798
Estimated acreage Service can supply in season of 1922		282,693
Acreage irrigated, season of 1920 (exclusive of vested water-right lands)		131,760
Acreage irrigated, season of 1920, covered by crop census		109,760
Acreage cropped under irrigation season of 1920, covered by crop census		100,700
Crops:		
Value of irrigated crops, season of 1920		$4,653,400.00
Value of irrigated crops per acre cropped		46.20
Finances:		
Appropriation—		
Fiscal year 1921—		
Amount specified in appropriation act	$774,000.00	
Miscellaneous collections and transfers to other projects	34,319.82	
Increase of compensation	43,062.58	
Total amount authorized		$851,382.40
Encumbrances—		
Disbursements and transfers received	647,272.98	
Current liabilities	36,308.14	
Contingent liabilities	2,762.75	
Increase compensation	43,062.58	
Total incumbrances		729,406.45
Unencumbered balance on July 1, 1921		121,975.95
Fiscal year 1922—		
Amount specified in appropriation act		1,570,000.00
Fiscal year 1923—		
Proposed appropriation		1,300,000.00
Inventories:		
Value of stock on hand		87,334.19
Value of plant and equipment in use		76,868.93
Construction cost and per cent completed:		
Gross cost to June 30, 1921	13,186,441.82	
Less revenues and adjustments	782,038.97	
Net cost to June 30, 1921		12,404,402.85
Per cent completed on June 30, 1921	99	
Estimated per cent completed on June 30, 1922	99.5	
Estimated per cent completed on June 30, 1923	100	
Value of construction water-right contracts and other resources to repay net cost of project		12,080,789.85
Revenues held in reserve		37,396.52
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$921,281.94	
Less charges due and miscellaneous revenues	921,970.18	
Excess		688.24

[1] Including possible extension.
[2] Including partial service to vested water-right lands.

Drainage:		
Total cost of drainage works to June 30, 1921		[3] $936,507.09
Miles of drains built to June 30, 1921—		
Open	$176.83	
Closed	.50	
Total		177.33
Estimated acreage damaged by seepage on June 30, 1921		7,150
Estimated acreage protected by drains on June 30, 1921		94,900
Estimated acreage to be protected by authorized system		101,400

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges	$928,552.40	$851,779.59	.....	$25,092.00	$876,871.59	$51,680.81
Operation and maintenance charges (public notice)	868,650.19	722,152.74	$29,488.88	.....	751,641.62	117,008.57
Supplemental construction to be paid as operation and maintenance	46,649.27	19,667.44	841.74	.....	20,509.18	26,140.09
Rentals, irrigation water	706,086.94	694,264.29	.....	5,088.50	699,352.79	6,734.15
Rentals, power	96,417.61	96,417.61	.....	.....	96,417.61	.....
Rentals, grazing and farming lands	20,862.18	20,675.13	.....	.....	20,675.13	187.05
Contractors' freight refunds	13,470.24	13,405.54	.....	.....	13,405.54	64.70
Miscellaneous	562,041.12	556,342.08	.....	.....	556,342.08	5,699.04
Total	3,242,729.95	2,974,704.42	30,330.62	30,180.50	3,035,215.54	207,514.41

CONSTRUCTION DURING FISCAL YEAR.

Distribution Division.—Construction work on this division consisted of the installation of various small timber, concrete, and masonry structures, which were necessary to take care of new land coming under irrigation. Considerable work was also done in connection with the taking over and completing of New York laterals, in accordance with the contract entered into under date of July 1, 1918, between the New York Canal Co. and the Government. The above work included the installation of 136 structures and the excavation of 5,600 cubic yards of material. The structures completed contained 128 cubic yards of concrete, 9 cubic yards of masonry, and 22,728 board feet of lumber.

Notus Canal Division.—During the past fiscal year the lower section of the Notus Canal, including the lateral system, was completed, as well as that part of the upper section previously delayed on account of right of way matters. The entire canal was ready for water at the opening of the irrigation season of 1921. The largest job done by Government forces was the concrete lining of 1,500 feet of 12-foot base canal, amounting to 4,226 square yards. All structures placed were of the minor class except two flumes and two concrete bridges. One of these was placed within the limits of Caldwell and the other at the crossing of the Idaho Pacific Highway.

Canal and lateral excavation was done by contract involving the excavation of materials as follows: Class 1, 237,657 cubic yards;

[3] Drainage cost includes all drainage work on project, both construction and operation and maintenance, divided as follows:

Chargeable to construction	$927,374.60
Chargeable to operation and maintenance	9,132.49
Total	936,507.09

class 2, 28,224 cubic yards; class 3, 20,816 cubic yards; overhaul, 29,473 cubic yards. Work done by Government forces resulted in placing of material as follows: Lumber, 88,400 feet b. m.; concrete, 2,274 cubic yards, in which were used 2,733 barrels of cement and 47,776 pounds of steel.

Riverside and Big Bend drainage.—Construction of this feature, which was commenced during the early part of the fiscal year 1919, has progressed very favorably and at the end of the fiscal year was practically finished. About 44 miles of drains had been completed, which involved the excavation of 1,789,169 cubic yards of material. The completed work also includes the installation of 734 miscellaneous structures, containing 658,292 board feet of lumber. During the fiscal year 239 structures were installed and 330,853 cubic yards of material were excavated. Bucyrus electric drag lines were used on the excavation of all drains. The completion of this feature will require some additional work during the fiscal year of 1922.

BOISE POWER PLANT.

The hydroelectric plant at Boise Diversion Dam was installed primarily for use in connection with the construction of Arrowrock Dam. The lease of this plant to the Idaho Power Co., as successor to the Electric Investment Co., for a period of five years, was terminated on April 30, 1921. A new contract was approved on April 2, 1921, providing for the operation of the plant by the United States and an exchange schedule arranged wherein the Boise project may receive power for dragline excavators direct from lines of the company. Provision is also made whereby the Minidoka project may receive power from the company's lines in the vicinity of Milner and Burley and settlement therefor made through the exchange provisions of this contract. The contract expires on April 1, 1923.

SEEPAGE AND DRAINAGE.

The accompanying table gives the approximate area of seeped land on the Boise project. These areas are partly productive, but at the present rate of rise of ground water they will soon be waste lands. In various localities of the Distribution Division large areas show signs of seepage. This is especially true on the Wilder Bench, Fargo Basin, and Frohman Slope. In the Nampa and Meridian Irrigation District several areas are reaching a stage necessitating additional drainage to protect lands having Government water rights. Additional wells were put down in the Pipher well district and relieved seepage conditions to some extent.

Name of area.	Acreage reclaimed.	Estimated acreage still seeped.
Pioneer Irrigation District	10,200	300
Nampa and Meridian Irrigation District	5,850	500
Fargo Basin	700	1,000
Arena Basin	.....	800
Ten Mile	.....	400
Greenleaf	.....	1,200
Frohman	.....	600
Riverside and Big Bend Irrigation Districts	5,150	350
Miscellaneous	.....	2,000
Total	21,900	7,150

ECONOMIES OF GOVERNMENT WORK.

A local drainage district recently awarded contracts for the excavation of drains at approximately 21 cents per cubic yard. Similar work executed by the Service in the Riverside Irrigation District with the use of Bucyrus electric drag lines was excavated at a cost of 7.82 cents per cubic yard.

OPERATION AND MAINTENANCE.

During 1920 water was delivered on the basis set forth in public notice issued February 21, 1920—that is, a minimum charge of $1.50 per irrigable acre whether water was used thereon or not—which entitled the water user to 2 acre-feet of water, measured on the land; further water was furnished at the rate of 40 cents per acre-foot during the flood season ending June 30 and 70 cents per acre-foot during the storage season beginning July 1. The revenue from this source amounted to approximately $383,000 and resulted in the delivery of 542,665 acre-feet to 2,652 farms, containing an irrigable area of 150,760 acres. The average amount of water used was 3.60 acre-feet, at an average cost of $2.32 per acre for operation and maintenance.

The rights of the United States to divert water from the natural flow of the Boise River terminated for the season of 1920 on July 13, after which it became necessary to draw entirely from Arrowrock Reservoir to maintain the necessary discharge in the Main Canal.

The full storage capacity of Arrowrock Reservoir was available for the season; the maximum storage was reached on June 9, 1920. On September 13 all the available water had been drawn out. The maximum storage for Deer Flat Reservoir was 175,698 acre-feet, which was reached on April 25, 1920.

On August 21, 1920, all Government water users were cut to a delivery of one-half miner's inch per irrigable acre. The total diversion for the project during 1920 was 853,810 acre-feet, or 5.66 acre-feet per acre, which included canal and reservoir losses. The loss from Deer Flat Reservoir was 17.8 per cent, as compared with 16.3 per cent for 1919.

The reservoirs of the Idaho-Iowa Lateral & Reservoir Co. were partly filled, under contract, through the Government canal system.

Under permanent contracts water was released from Arrowrock Reservoir to supplement the vested rights of the following irrigation districts and canal companies: Nampa and Meridian Irrigation District; Pioneer Irrigation District; Settlers Irrigation District; Farmers' Cooperative Ditch Co.; Farmers' Union Ditch Co.; New York Canal Co.

Under a contract with the Black Canyon Irrigation District dated April 30, 1921, provision was made for the United States to operate the Notus Canal during the irrigation season of 1921. Water was delivered upon demand of the individual water users according to the acreage in crop.

Maintenance.—Upon the completion of the 1920 irrigation season, work comprising canal cleaning, burning weeds, riprapping, and replacing deteriorated structures was commenced and prosecuted vigorously with a view to completion as far as possible during the fall months and while teams and men were plentiful. The most impor-

tant structure replaced was the Richards Point Wasteway. This replacement involved the construction of 1,453 linear feet of reinforced concrete lining having a base of 8 feet. Owing to weather conditions, work on this structure was discontinued late in November and finished in the spring of 1921. On the Deer Flat Lowline and Mora Canals considerable coarse gravel riprapping was placed at points showing extreme erosion. At the beginning of the 1921 irrigation season all canals and laterals were in good condition, and no trouble was experienced in raising the various canals to capacity.

Historical review, Boise project, Idaho, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage to which Service was prepared to furnish water	207,000	[1] 223,866	[1] 223,866	[1] 274,339	[1] 274,125	[1] 274,379
Acreage irrigated	97,127	[2] 101,315	[2] 95,524	[2] 110,000	[2] 125,000	[2] [3] 131,760
Miles of canals operated	973	980	982	988	989	1,000
Water diverted (acre-feet)	542,102	656,854	618,272	824,462	759,084	853,810
Water delivered to land per acre of land irrigated (acre-feet)	2.81	3.56	3.07	3.75	3.34	3.60

[1] Including partial service to vested water-right lands.
[2] Acreage served with full water supply.
[3] 109,760 covered by crop census.

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 21.

SETTLEMENT.

The great demand for farm and city property which existed during the past several years declined considerably during the fiscal year 1921. This condition is attributed to the reduction in the prices received from the sale of all farm products and live stock. Few sales of farm land were being made and the owners who were in a financial condition to hold their lands were not offering to sell at prices much lower than received during the past few years. Owing to financial conditions commercial growth has been retarded. However, a general optimistic feeling prevails and there was a tendency to commence building, especially homes and farm improvements.

Settlement data, Boise project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	3,926	3,932	3,992	3,992	4,000
Population	12,560	12,580	13,200	15,000	16,000
Number of irrigated farms	2,450	2,780	3,060	3,207	3,260
Operated by owners or managers	1,590	1,900	2,090	2,545	2,417
Operated by tenants	860	880	970	662	843
Population	7,520	8,340	9,170	10,000	11,176
Number of towns	10	10	10	10	10
Population	34,350	34,750	36,000	40,000	36,400
Total population in towns and on farms	46,910	47,330	49,200	55,000	52,400
Number of public schools	22	22	24	24	28
Number of churches	52	52	52	54	56
Number of banks	15	15	15	15	17
Total of capital stock	$1,750,000	$1,800,000	$1,800,000	$2,000,000	$1,850,000
Amount of deposits	$9,000,000	$11,500,000	$11,500,000	$13,500,000	$20,600,000
Number of depositors	[1] 24,850	[1] 25,000	[1] 25,000	[1] 28,000	[1] 32,000
Total number of relinquishments	18	32	.....	3	2

[1] Estimated; some banks refuse to give number of depositors.

PRINCIPAL CROPS.

The principal crops grown on the project during 1920, according to value, were alfalfa, wheat, potatoes, clover seed, and corn. Alfalfa covered the largest area, amounting to 45,974 acres, showing an increase over the previous year of 4,123 acres. With the exception of apples, potatoes, and wheat, there was a marked decrease in the value of crops per acre. The most notable decreases in crop values over 1919 were: Clover seed, 53 per cent; alfalfa, 33 per cent; and corn, 21 per cent. Market conditions were poor and a marked decrease in the average crop return from $63.12 in 1919 to $46.20 in 1920 is noted. All these figures are restricted to the areas covered by the usual crop census of the Reclamation Service and do not include lands in the New York Canal tract nor in the Nampa and Meridian and Pioneer Irrigation Districts, to which the Government furnished water to supplement partial vested rights.

Crop report, Boise project, Idaho, 1920.

[Limited to the Government project proper, excluding large areas served under Warren Act contracts or other arrangements.]

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Average per unit of yield.	Total.	Average. per acre.
Alfalfa hay	45,974	Ton	198,459	4.32	$7.00	$1,389,210	$30.22
Alfalfa seed	1,031	Bushel	3,006	2.92	8.40	25,250	24.49
Apples	1,319	Pound	4,666,622	3,538	.02	93,330	70.76
Barley	3,108	Bushel	90,469	29.11	.60	54,280	17.47
Beans	45	...do	493	10.96	3.60	1,770	39.44
Clover hay	7,731	Ton	11,385	1.47	7.00	79,695	10.31
Clover seed	5,804	Bushel	24,070	4.15	9.00	216,630	37.32
Indian corn	3,835	...do	172,029	44.86	.80	137,620	35.89
Sorghum corn	44	...do	1,390	31.59	.80	1,112	25.27
Corn, fodder	278	Ton	2,388	8.59	4.00	9,550	34.36
Small fruits	145	Pound	141,046	972.70	.10	14,100	97.27
Garden	569	Acre		$100.00		56,900	100.00
Hay	54	Ton	121	2.24	9.00	1,090	20.17
Millet seed	9	Bushel	248	27.56	.80	200	22.04
Oats	2,399	...do	78,662	32.79	.65	51,130	21.31
Onions	46	...do	3,219	69.98	.75	2,414	52.48
Pasture	5,857	Acre		$20.00		117,140	20.00
Peaches	98	Pound	187,585	1,914.14	.06	11,255	114.85
Pears	19	...do	49,400	2,600.00	.02	990	52.00
Prunes	458	...do	1,041,295	2,273.57	.01¾	18,220	39.79
White potatoes	4,386	Bushel	931,970	212.49	1.15	1,071,760	244.36
Sweet potatoes	99	...do	21,512	217.29	2.00	43,024	434.59
Rye	123	...do	1,249	10.15	1.40	1,750	14.22
Wheat	23,460	...do	750,041	31.97	1.65	1,237,570	52.75
Pop corn	88	...do	4,720	53.64	3.00	14,160	160.91
Sweet corn	7	...do	180	25.71	2.50	450	64.29
Lettuce	14			$200.00		2,800	200.00
Less duplicated areas	6,300						
Total cropped acreage	100,700	Total and average				4,653,400	46.20
Irrigated, no crop:							
Nonbearing orchard	194						
Young alfalfa	6,110						
Young clover	574						
Ground, fall plowed	1,509						
Miscellaneous	684						
Less duplicated areas	11						
Total irrigated acreage	109,760						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	118,687	2,652	82.9
Total irrigated area farms reported	109,760	2,652	76.7
Irrigated under water-right applications	104,183		72.8
Irrigated under rental contracts	5,577		3.9
Total cropped area farms reported	100,700	2,652	70.4

Estimated irrigation and crop results, Boise project, Idaho, 1920.

[For lands other than reported on regular crop report.]

Name of water user (irrigation district, company, etc.).	Irrigable acreage.	Irrigated acreage.	Harvested acreage.	Value of crops.		Approximate per cent of total water used supplied by United States.
				Total.	Average per acre.	
Nampa and Meridian Irrigation District [1]	48,785	45,000	44,000	$1,980,000	$45.00	58
Pioneer Irrigation District	34,400	32,000	31,500	1,386,000	44.00	26
Settlers' Irrigation District	12,000	11,200	11,100	500,000	45.00	10
New York Canal Co.	21,500	19,000	18,000	720,000	40.00	54
Farmers' Union Ditch Co.	8,100	6,800	6,700	268,000	40.00	12
Farmers' Cooperative Ditch Co.	15,500	13,400	13,100	550,000	42.00	8
Total and average	140,285	127,400	124,400	5,404,000	43.50	37.3

[1] About 50 per cent of the land received its entire supply from Government water. The balance received a supplemental supply.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, FEBRUARY 15, 1921.

1. **Annual operation and maintenance charge for drainage.**—In pursuance of section 4 of the national reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof, or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1921 and until further notice against all lands of the Boise project under public notice (except the 1,800 acres, more or less, in the State of Oregon) shall be divided into two parts:

(*a*) A regular operation and maintenance charge to be hereafter announced in the usual manner to cover all costs of operation and maintenance other than drainage.

(*b*) A special operation and maintenance charge for drainage purposes of $1 per irrigable acre per year until further notice, to become due and payable 50 cents per irrigable acre on April 1, 1921, and 50 cents per irrigable acre on October 1, 1921, and 50 cents per irrigable acre on March 1 and October 1 of each year thereafter until further notice, the money received from such special operation and maintenance charge to be used after the same has been paid in to the United States, in providing drainage on the Boise project to minimize or prevent as far as possible the swamping and water-logging of the lower lying lands of the project by seepage from the irrigation of the higher lands and by seepage from the irrigation system of the project, to lessen the damage which would otherwise result from the operation of said canal system and to maintain the irrigability of the lands of the project, said drainage charge to be considered a part of the minimum operation and maintenance charge per irrigable acre, the remainder of said minimum charge per acre and all charges per acre-foot of water used in excess of the amounts of water allowed for such minimum charge to be hereafter announced and determined by public notices to be hereafter issued from time to time.

JOHN BARTON PAYNE,
Secretary of the Interior.

PUBLIC NOTICE, FEBRUARY 18, 1921.

Annual operation and maintenance charges.—In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1921, and until further notice, against all lands of the Boise project, Idaho-Oregon, under public notice (except New York water-right lands under contract with the United States for storage water), shall be 50 cents per acre-foot for all water delivered prior to July 1, and 70 cents per acre-foot for all water delivered on and after July 1 of each irrigation season, but a minimum charge of $1.50 per irrigable acre will be made against all irrigable lands under public notice (except said New York water-right lands) whether water is used thereon or not, the above-named charges to be in addition to the operation and maintenance charge for drainage purposes announced in public notice of February 15, 1921: *Provided*, That owners of New York water-right lands who are under contract with the United States for storage water shall pay 75 cents per irrigable acre, whether water is used thereon or not, which will entitle the user to 1 acre-foot of water per irrigable acre after July 1, and additional water will be delivered at the rate of 70 cents per acre-foot. In case stock and domestic water is delivered outside of the irrigation season a charge of $2 per acre-foot will be made for the same, with a minimum charge of $2 to each applicant for such service. All the above-named operation and maintenance charges will be due and payable on March 1, following the irrigation season; but where water-right application is made for land in private ownership after August 1 no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Boise project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$6,054.10
Inventory of materials and supplies on hand			87,334.19
Plant and equipment in use			76,888.93
Current accounts receivable			207,514.41
Construction charges not due			11,110,178.71
Unearned value of contracts			2,762.75
Construction cost of works		$12,107,233.69	
Operation and maintenance during construction		1,079,208.13	
Gross construction cost		13,186,441.82	
Less revenues and adjustments during construction period		782,038.97	
Net construction cost			12,404,402.85
Operation and maintenance cost under public notice		1,141,680.98	
Less revenues and adjustments		961,399.54	
Excess to Dec. 31, 1920	$688.24		
Net cost Jan. 1 to June 30, 1921	180,369.68		
			179,681.44
Investment items in transit			900.81
Total debits			24,075,698.19

CREDITS.

Current accounts payable			$36,739.35
Contingent and deferred liabilities			8,816.85
Resources for repaying cost of project			12,080,789.85
Revenues held in reserve			37,396.52
Investment:			
Disbursements and transfers from other projects	$15,079,427.71		
Items in transit	662.41		
Total		$15,080,090.12	
Less collections and transfers to other projects	3,168,372.90		
Items in transit	[1] 238.40		
Total		3,168,134.50	
Net investment			11,911,955.62
Total credits			24,075,698.19

Construction cost and revenue, Boise project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys:		
Distribution division	$3,258.74	$127,837.63
Storage division		8,720.61
Total examination and surveys	3,258.74	136,558.24
Storage system:		
Deer Flat Reservoir—		
Location and surveys		4,881.13
Right of way		234,573.74
Upper embankment		343,892.07
Lower embankment		354,645.82
Forest embankment		6,206.06
Equalizing channels		5,729.32
Clearing site, etc		7,686.16
Subtotal		957,614.30
Arrowrock Reservoir:		
Preliminary and general work		177,172.37
Right of way		70,570.86
Water rights		20,041.78
Arrowrock Dam		3,611,048.51
Log conveyor		54,215.66
Crane		9,344.98
Power preparatory		19,451.36
Spillway		531,136.51
Bridge over spillway		3,749.04
Subtotal		4,496,731.07
Total storage system		5,454,345.37
Canal system:		
Main South Side Canal	[1] 353.90	2,063,485.41
Notus Canal (North Side)	199,492.46	410,878.46
Total canal system	199,138.56	2,474,363.87
Lateral system:		
From Main Canal	6,912.15	1,462,235.92
From Deer Flat Reservoir	3,247.50	1,181,516.60
From Notus Canal	18,913.28	18,913.28
Penitentiary lateral		24,355.93
Total lateral system	29,072.93	2,687,021.73
Drainage system:		
Pioneer District		297,231.38
Nampa-Meridian District	1,750.98	303,357.26
Fargo Basin		37,771.48
From Deer Flat		31,796.98
Riverside District	58,236.50	249,596.53
Miscellaneous:		
Gibbons Drain		1,036.31
West End Drain		2,342.54
General investigations and surveys		4,242.12
Total drainage system	59,987.48	927,374.60

[1] Contra

Construction cost and revenue, Boise project—Continued.

Features.	Fiscal year 1921.	To June 30, 1921.
Power system, Boise River power plant:		
Original cost		$254,795.25
Less items transferred to cost of Arrowrock Dam		59,489.98
Total power system		195,305.27
Farm units		46,953.50
Permanent improvements:		
Distribution division—		
Project office building and grounds		21,749.07
Water masters' headquarters—		
Lower embankment		4,217.64
Wilder		3,993.32
Upper embankment		2,531.91
Kuna		3,375.49
Rock spur		947.18
Camp Three		3,495.11
Ditch riders' headquarters—		
Golden Gate drop		795.83
Fargo drop		2,177.95
Robinson Hill pipe line		222.84
Eight Mile		375.32
Barber Wasteway		178.01
Drop into Deer Flat Reservoir		326.59
Gate tenders' House:		
Indian Creek drop		383.29
Indian Creek diversion works		308.83
Development Government farms		6,235.24
Roads		272.41
Miscellaneous small improvements	$232.31	3,615.44
Subtotal	232.31	55,201.47
Storage division—		
Gate tenders' house, Arrowrock Dam		4,004.01
Camp buildings at Arrowrock (permanent)		3,683.85
Camp buildings at diversion dam (permanent)		1,882.36
Roads		76,486.72
Subtotal		86,056.94
Total permanent improvements	232.31	141,258.41
Telephone system:		
Distribution division		34,377.50
Storage division		9,675.20
Total telephone system		44,052.70
Operation and maintenance during construction (water-rental basis)		1,079,208.1
Total cost of construction features	291,690.02	13,186,441.82
Less revenues earned during construction period:		
Rentals of buildings	4,762.82	32,030.13
Rentals of irrigation water	10.83	657,066.26
Net power earnings (prior to public notice)		59,515.11
Freight refunds	69.01	13,470.24
Other revenues, unclassified		23,882.09
Loss on hospital operations		[1] 4,067.23
Other profits on operations, unclassified	[1] 30.23	142.37
Total revenues	4,812.43	782,038.97
Net construction cost	286,877.59	12,404,402.85

[1] Contra.

Operating cost and revenue, Boise project.

Item.	Calendar year, 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COST.						
Storage works	$15,598.62	$567.44	$16,166.06	$51,844.63	$4,766.32	$56,610.95
Canal system	13,085.76	7,432.12	20,517.88	35,190.25	42,065.37	77,255.62
Lateral system	89,130.00	217,561.59	306,691.59	239,781.54	525,306.90	765,088.44
Drainage system		3,876.67	3,876.67		14,922.23	14,922.23
Flood protection						
Permanent improvements		2,661.42	2,661.42		5,514.02	5,514.02
Farming operations						
Miscellaneous expense		413.77	413.77		1,890.68	1,890.68
Total cost	117,814.38	232,513.01	350,327.39	326,816.42	594,465.52	921,281.94
REVENUE.						
Operation and maintenance repayments under contracts with water users:						
Charges due			363,567.02			867,242.97
Advance payments			[1] 23.82			
Interest and penalties			1,094.44			4,373.03
Water rentals			14,370.93			48,417.29
Rentals of lands and buildings			[1] 2,218.80			
Other revenues, unclassified			1,545.31			19,837.24
Discounts (deduct)						[1] 17,900.35
Total revenue			378,335.08			921,970.18
Difference: Excess			28,007.69			688.24

[1] Contra.

Cost by calendar years, Boise project.

	Construction.			Operation and maintenance (gross).	Grand total.
	Original.	Operation and maintenance during.	Total.		
Year ending Dec. 31—					
1902	$2,274.51		$2,274.51		$2,274.51
1903	2,965.58		2,965.58		2,965.58
1904	20,809.47		20,809.47		20,809.47
1905	19,354.12		19,354.12		19,354.12
1906	602,924.72		602,924.72		602,924.72
1907	731,141.73	$9,455.80	740,597.53		740,597.53
1908	823,987.25	4,973.78	828,961.03		828,961.03
1909	836,509.76	41,388.89	877,898.65		877,898.65
1910	793,274.36	64,406.52	857,680.88		857,680.88
1911	2,025,053.46	51,841.70	2,076,895.16		2,076,895.16
1912	1,487,290.75	84,226.36	1,571,517.11		1,571,517.11
1913	1,126,916.73	137,330.56	1,264,247.29		1,264,247.29
1914	1,821,317.19	131,607.44	1,952,924.63		1,952,924.63
1915	769,368.08	170,723.36	940,091.44		940,091.44
1916	447,236.14	135,231.51	582,467.65		582,467.65
1917	[1] 157,512.76	248,022.21	90,509.45		90,509.45
1918	67,179.85		67,179.85	$294,216.48	361,396.33
1919	310,563.67		310,563.67	276,738.07	587,301.74
1920	242,398.87		242,398.87	350,327.39	592,726.26
Jan. to June, 1921	134,180.21		134,180.21	219,799.04	353,979.25
Total	12,107,233.69	1,079,208.13	13,186,441.82	1,141,080.98	14,327,522.80

[1] Contra.

Cost by fiscal years, Boise project.

	Construction.			Operation and maintenance (gross).	Grand total.
	Original.	Operation and maintenance during.	Total.		
Year ending June 30—Period 1902 to 1906, inclusive	$177,614.16	.....	$177,614.16	.....	$177,614.16
1907	825,797.94	$4,606.26	830,404.20	.....	830,404.20
1908	861,209.53	9,529.25	870,738.78	.....	870,738.78
1909	775,939.73	29,898.01	805,837.74	.....	805,837.74
1910	673,232.59	46,499.71	719,732.30	.....	719,732.30
1911	1,226,236.26	49,059.84	1,275,296.10	.....	1,275,296.10
1912	2,109,108.94	65,027.15	2,174,136.09	.....	2,174,136.09
1913	1,161,361.85	117,709.90	1,279,071.75	.....	1,279,071.75
1914	1,560,385.86	144,422.58	1,704,808.44	.....	1,704,808.44
1915	1,521,283.87	147,643.91	1,668,927.78	.....	1,668,927.78
1916	395,631.08	133,520.11	529,151.19	.....	529,151.19
1917	219,848.90	173,030.26	392,879.16	.....	392,879.16
1918	[1] 153,862.58	158,261.15	4,398.57	$130,333.66	134,732.23
1919	263,335.61	.....	263,335.61	303,606.43	566,942.04
1920	198,419.93	.....	198,419.93	327,770.98	526,190.91
1921	291,690.02	.....	291,690.02	379,369.91	671,059.93
Total	12,107,233.69	1,079,208.13	13,186,441.82	1,141,080.98	14,327,522.80

[1] Contra.

General expense, Boise project.

Office.	Fiscal year, 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total
Washington office	$5,457.38	$11,596.92	$17,054.30	$173,512.83	$85,579.27	$259,092.10
Project office	9,486.99	20,159.86	29,646.85	492,575.30	131,278.54	623,853.84
Denver office	4,057.09	8,621.32	12,678.41	36,648.32	26,636.49	63,284.81
Other offices and miscellaneous	199.75	424.48	624.23	75,085.76	10,946.89	86,032.65
Total	19,201.21	40,802.58	60,003.79	777,822.21	254,441.19	1,032,263.40
Percentage of general expense to gross cost	6.58	10.75	8.94	6.43	11.55	7.21

IDAHO, KING HILL PROJECT.

WALTER WARD, project manager, King Hill, Idaho.

LOCATION.

Counties: Elmore, Gooding, Owyhee, and Twin Falls.
Townships: 5 and 6 S., Rs. 8 to 13 E., Boise meridian.
Railroads: Oregon Short Line.
Project cities and towns and estimated population, June 30, 1921: Glenns Ferry, 1,132; King Hill, 175; Hammett, 75; Bliss, 190.

WATER SUPPLY.

Source of water supply: Malad River, fed by numerous large springs.
Area of drainage basin: Underground source, area indeterminate.
Annual run-off in acre-feet: Approximately 1,000,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water for season 1920: 11,340 acres.
Length of irrigation season: April 1 to October 10 —193 days.
Average elevation of irrigable area: 2,750 feet above sea level.
Rainfall on irrigable area: Nine-year average, 9 inches.
Highest recorded temperature: Nine-year average, 107° F.
Lowest recorded temperature: Nine-year average, —6° F.
Character of soil on irrigable area: Ranges from light to heavy sandy loam; heavy clay.
Principal products: Alfalfa, early vegetables, grains, fruit, and stock.
Principal markets: Portland, Boise, and small towns in southern Idaho.

CHRONOLOGICAL SUMMARY.

First irrigation by King Hill Irrigation Co., season of 1909.
Reconnoissance made and preliminary surveys begun by the United States in 1916.
Construction recommended by board of engineers August 17, 1916.
Construction authorized by Secretary July 2, 1917.
Reconstruction work begun by Reclamation Service in February, 1918.
Project 81.8 per cent completed June 30, 1921, based on total expenditure of $1,600,000.

IRRIGATION PLAN.

The irrigation plan of the King Hill project provides for the diversion of water from the Malad River, about 1 mile above its confluence with the Snake River, the conveyance of the water through a flume for about 4,000 feet, and the delivery of 300 second-feet to the canal system of the project by the Idaho Power Co.

The project main canal is approximately 52 miles long and crosses the Snake River at two points by means of siphons on steel bridges. About half the irrigable acreage lies on each side of the Snake River. The acreage to be supplied by gravity as now shown by the irrigable acreage plats is 15,621, with 574 acres to be supplied by pumps.

The present plans for the reconstruction of the project call for the building of several long concrete flumes, concrete and wood-stave siphons, wood-stave flumes, gunite flumes, and gunite or concrete lining.

SUMMARY OF GENERAL DATA FOR KING HILL PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		16,195
Public land entered to June 30, 1921	9,336	
Public land open to entry on June 30, 1921	161	
State land unsold, June 30, 1921	369	
Private land, June 30, 1921	6,329	
Acreage Service could have supplied in season of 1920		11,340
Estimated acreage Service can supply in season 1921		11,340
Estimated acreage Service can supply in season 1922		11,340
Acreage irrigated season of 1920		4,780
Acreage cropped under irrigation season of 1920		4,520

Crops:		
Value of irrigated crop season of 1920		$216,500.00
Value of irrigated crops per acre cropped		47.90
Finances:		
Appropriation—		
Fiscal year 1921—		
Amount specified in appropriation act	$320,000.00	
Increase under 10 per cent provision	32,000.00	
Miscellaneous collections and transfers issued	24,877.06	
Increase of compensation	28,294.97	
Total amount authorized		405,172.03
Encumbrances—		
Disbursements and transfers received	$327,703.63	
Current liabilities	10,533.78	
Increase of compensation	28,294.97	
Total encumbrances		366,532.38
		38,639.65
Fiscal year 1922—		
Amount specified in appropriation act		300,000.00
Encumbrances in fiscal year 1921—		
Disbursements and transfers received	$3,299.59	
Current liabilities	14,457.68	
Contingent liabilities	38,679.20	
Total encumbrances		56,436.47
Unencumbered balance on July 1, 1921		243,563.53
Fiscal year 1923—		
Proposed appropriation		450,000.00
Inventories:		
Value of stock on hand		25,304.60
Value of plant and equipment in use		91,036.64
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$1,212,678.45	
Less revenues and adjustments	2,232.79	
Net cost to June 30, 1921		1,210,445.66
Per cent completed on June 30, 1921		81.8
Estimated per cent completed on June 30, 1922		88.4
Estimated per cent completed on June 30, 1923		100.0
Drainage: Miles of open drains built to June 30, 1921		[1] 0.3
Estimated acreage protected by drains on June 30, 1921		600

Status of returns to the reclamation fund on account of various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected (cash).	Uncollected.
Rentals, irrigation water	$3,811.78	$3,811.78	.....
Contractor's freight refunds	557.78	510.28	$47.50
Miscellaneous	6,644.02	4,353.61	2,290.41
Total	11,013.58	8,675.67	2,337.91

CONSTRUCTION COMPLETED DURING FISCAL YEAR.

Automatic head gate at station 40+83.—This is a concrete structure with a 12-foot steel radial gate, which is automatically operated by two steel floats in wells at the side of the structure. The concrete structure was built during the fiscal year 1920, but as the gates and floats were not received until after the beginning of the irrigation season they were not placed until December, 1920.

Siphon No. 1, betterments and repairs, station 69+78.—A temporary timber connection was built to connect Siphon No. 1 with the new section of the Head End Flume.

[1] Drain shown was built prior to the taking over of construction by the Government.

Head End Flume, station 69+78 to 96+76.—This structure is of reinforced concrete, 12 feet 6 inches wide and 5 feet 2½ inches deep. The side walls are 5½ inches thick and the floor is 6 inches thick. This flume is of continuous type and 2,703 linear feet were placed. This structure replaces about the same length of 100 inches wood-stave pipe.

Tuanna Siphon and Wasteway, station 383+55 to 387+36.53.—This is a continuous concrete pipe, 8 feet in diameter, the shell of which varies in thickness from 7 to 9 inches. The inlet and outlet are of reinforced concrete. The wasteway is located in the inlet to the siphon and is controlled by two 4 by 4 foot cast-iron gates. The wasteway chute is of reinforced concrete, discharging directly onto the rock slope of Tuanna Gulch. A 6-inch valve at the bottom of the gulch provides for draining the siphon. This structure replaces an old timber flume on trestle.

Cassia Siphon and Wasteway, station 607+85.25 to 611+27.88.—This is a continuous concrete pipe, 7 feet 6 inches in diameter, with a shell thickness varying from 7 to 8 inches. The inlet and outlet of the siphon are of reinforced concrete. The wasteway is located in the inlet to the siphon, the discharge being regulated by two 4 by 4 foot iron gates. A rectangular concrete chute connected to an 8 by 4 foot timber flume carries the water to the break of slope, where it discharges onto the rock surface of the side hill. A 6-inch valve at the bottom of the gulch provides for draining the siphon. This structure replaces an old timber flume on trestle.

Four-Mile Flume, station 759+25 to 776+59.5.—This is a reinforced concrete structure of the continuous type. The flume is 8 feet 7 inches wide and 5 feet deep, with walls 5½ inches thick and floor 6 inches thick. The length of flume built was 1,794 feet, including the concrete inlet. This structure replaces about 1,794 feet of an old timber flume.

Wasteway No. 7, station 775+84.—This is a reinforced concrete structure, with the floor dropped 5 feet 6 inches to provide for a sand box. The discharge is controlled by two 4 by 4 foot cast-iron gates. A reinforced concrete chute discharges the water over the hillside. The structure was built to protect Big Pilgrim Siphon.

Big Pilgrim Siphon, station 777+29.—The reinforced concrete inlet and outlet of this siphon were built during this period. These structures replace temporary timber structures built previously.

McEachren wood-stave flume, station 1159+10 to 1165+01.—This is an 8.8-foot diameter wood-stave flume on a timber trestle. The transition from earth canal to the flume is of reinforced concrete. The flume is 586 feet in length. The structure replaces about 586 feet of an old timber flume on trestle.

McEachren Concrete Flume, station 1165+01 to 1179+95.—This flume is of the continuous type, built of reinforced concrete, and is 8 feet wide and 4 feet 9 inches deep; the walls are 5 inches thick and the floor is 6 inches thick. The length of flume is 1,499 feet. The structure replaces a portion of an old timber flume that was in very bad condition.

Wasteway No. 11, station 1173+98.52.—This structure is of reinforced concrete, with a 5 by 4 foot cast-iron gate and a continuous reinforced concrete chute, the size of which varies from 5 feet wide by 5 feet high to 4 feet wide by 3 feet high. The thickness of floor

and wall varies from 4½ to 4 inches. This structure replaces an old timber wasteway and protects Siphon No. 5.

Turnout to Lateral No. 4, station 1175+18.86.—This is a reinforced concrete structure, and its discharge in controlled by a 3 by 4 foot cast-iron gate. It replaces an old timber turnout and is used to deliver water to Lateral No. 4.

Temporary connection from McEachren Concrete Flume to Siphon No. 5, station 1179+95 to 1183+69.22.—This structure is a wood-stave pipe 100 inches in diameter with a timber connection to the McEachren Concrete Flume and a taper connection to the 57-inch wood-stave pipe of Siphon No. 5. The length of this structure is 374 feet. The structure replaces a portion of an old timber flume.

Greer Combination Flume and lining, station 1308+04 to 1310+26; station 1322+40 to 1326+04; and station 1354+42 to 1356+50.—These structures are of reinforced concrete, with a bottom width of 12 feet and a depth of 4 feet. One wall is vertical and is 5 inches thick; the other wall has a slope of 1½:1 and is 3 inches thick; the floor varies from 3 to 5 inches thick. These structures replace old timber flumes which were in bad condition.

Greer lining, station 1320+15 to 1322+40; station 1326+04 to 1335+91; station 1351+87 to 1354+42; and station 1356+50 to 1363+80.—These sections of lining are of reinforced concrete 3 inches thick. The bottom width is 11 feet and the depth is 3.9 feet with side slopes of 1½ : 1. The first two sections replace portions of an old timber flume which was in bad condition. The last two sections are used to prevent seepage in the old earth canal.

Slick Flume, Main Canal Extension, station 291+76 to 372+90.—A portion of the flume bench in the vicinity of station 330 was excavated during the month of June by the use of a drag line.

SEEPAGE AND DRAINAGE.

At the time the Government took over the reconstruction of the project one open drain about 0.3 mile long had been constructed. This drain protected about 600 acres of land in Pasadena Valley. No more drains are contemplated.

BOARD MEETINGS.

Date.	Subject.	Personnel.
Aug. 17, 1916	Report on King Hill project	A. J. Wiley, D. W. Cole, E. J. Hopson.
Sept. 12, 1917	King Hill reconstruction	D C. Henny, J. L. Savage, J. H. Miner.
Oct. 29, 1917	Estimate to complete	D. C. Henny, Jas. Munn, J. H. Miner.
Apr. 17, 1918	Construction program	Jas. Munn, Walter Ward, J. H. Miner.
Apr. 18, 1918	Equipment for King Hill project	Do.
May 27, 1918	Changes in construction	J. H. Miner, Walter Ward, J. L. Savage.
May 17, 1919	Reconstruction program, fiscal year 1920	Jas. Munn, Walter Ward, J. L. Savage.
Do	Additional construction needed in excess of present contract.	Do.
Mar. 13, 1920	Report on concrete work	A. J. Wiley, Walter Ward, J. L. Savage.

ECONOMIES OF GOVERNMENT WORK.

During the fall of 1920, owing to the fact that repair parts could not be received for some of the Government trucks, it was necessary to contract the hauling of gravel to the Head End Flume, Tuanna Siphon, and Cassia Siphon. A total of 2,172 cubic yards of material

was hauled at a cost of $4,833.56, whereas had we been in position to perform the service with Government equipment the cost would have been but $3,784.20, a saving of $1,049.36.

OPERATION AND MAINTENANCE.

The King Hill Irrigation District operated and maintained the canal and lateral systems until midnight of May 17, 1921, at which time the Reclamation Service took over this work under a contract with the said irrigation district.

During the season of 1920 there was only one interruption to the delivery of water after July 1. On July 12 the water was turned out for four days in order to make repairs to a portion of the Head End Flume which had settled to such an extent that it would not safely carry the necessary amount of water. Water was turned out of the system on September 7.

Water was turned in at the head gates on April 4, 1921, and deliveries started about a week later. The flow of water has been continuous except for a period of 12 hours on May 25 when the water was turned out in order that repairs could be made to Siphon No. 1 and other points.

During the winter of 1920–21 the King Hill Irrigation District made extensive repairs to Siphons No. 1 and No. 3, as well as some work in cleaning earth canal.

Historical review, King Hill project, by calendar years.

Item.	[1] 1920.
Acreage for which Service was prepared to supply water	[2] 11,340
Acreage irrigated	4,780
Miles of canals operated	83.2
Water diverted (acre-feet)	43,660
Water delivered to land (acre-feet)	22,420
Per acre of land irrigated (acre-feet)	4.69

[1] Estimate only. The King Hill Irrigation District kept no water record.
[2] Partial supply can be furnished to 14,500 acres.

SETTLEMENT.

Several ranches have changed hands during the past year and some new acreage has been put into cultivation.

Settlement data, King Hill project, by calendar years.

[Based largely on estimates.]

Item.	1917	1918	1919	1920
Total number of farms on project	225	225	225	225
Population	350	350	350	424
Total irrigated farms	125	125	125	125
Operated by owners or managers	110	110	110	110
Operated by tenants	15	15	15	15
Number of towns	3	3	3	4
Population	1,350	1,425	1,500	1,572
Total population of towns and farms	1,700	1,775	1,850	1,974
Number of public schools	4	4	4	5
Number of churches	4	4	5	5
Number of banks	1	1	1	2
Total capital stock	$20,000	$20,000	$20,000	$30,000
Amount of deposits	.....	$183,436	$245,545	$418,548
Number of depositors	.....	758	738	1,060

PRINCIPAL CROPS.

The principal crops grown on the project during 1920 were alfalfa, wheat, potatoes, fruits, melons, and garden stuffs. The late frosts in the spring of 1920 very materially damaged the fruit crops on the project and breaks in the canal system seriously damaged all other 1920 crops. Several of the water users put in early potatoes in the spring of 1921 and reported good yields, the price in the early part of June being 5 to 6 cents per pound in less than carload lots.

Crop report, King Hill project, Idaho, 1920.

[Data furnished by King Hill Irrigation District, which operates project. This was built under private auspices and is being reconstructed by the United States.]

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	3,300	Ton	11,720	3.5	$11.96	$140,120	$42.44
Alfalfa seed	135	Bushel	671	5	10.85	7,280	53.92
Apples	277	Pound	194,706	703	.04	7,960	28.73
Barley	67	Bushel	1,465	22	1.10	1,610	24.10
Clover hay	13	Ton	19	1.5	15.00	285	21.92
Clover seed	13	Bushel	150	12	5.33	800	61.54
Corn, Indian	106	do	3,345	32	1.43	4,770	45.04
Corn fodder	7	Ton	17	2.5	7.53	130	18.29
Fruits, small	13	Pound	11,050	850	.10	1,100	85.00
Garden	47					8,880	188.83
Hay	11	Ton	37	3.5	13.38	495	45.00
Melons	46	Pound	286,586	6,230	.02	4,990	108.59
Oats	151	Bushel	6,093	40.5	.96	5,830	38.62
Pasture	190					2,530	13.32
Pears	21	Pound	26,920	1,282	.04	1,040	49.52
Potatoes, white	125	Bushel	8,322	66.5	2.50	20,770	166.21
Wheat	238	do	3,569	15	2.22	7,910	33.26
Less duplicated areas	240						
Total cropped acreage	4,520	Total and average				216,500	47.90
Irrigated, no crop:							
Nonbearing orchard	60						
Young alfalfa	200						
Total irrigated	4,780						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	7,556	117	46.7
Total irrigated area farms reported	4,780	117	29.5
Total cropped area farms reported	4,520	117	27.9

FINANCIAL STATEMENT.

Condensed financial statement, King Hill project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit		$7.44
Inventory of materials and supplies on hand		25,304.60
Plant and equipment in use		91,036.64
Current accounts receivable		2,337.91
Unearned value of contracts		38,679.20
Construction cost of works	$1,193,477.87	
Operation and maintenance during construction	8,350.01	
Unadjusted clearing accounts	10,850.57	
Gross construction cost	1,212,678.45	
Less revenues and adjustments during construction period	2,232.79	
Net construction cost		1,210,445.66
Investment items in transit		1,389.94
Total debits		1,369,201.39

CREDITS.

Current accounts payable		25,004.38
Contingent and deferred liabilities		38,686.64
Investment:		
Disbursements and transfers from other projects	$1,358,477.04	
Items in transit	1,389.94	
Total	1,359,866.98	
Less collections and transfers to other projects	54,356.61	
Net investment		1,305,510.37
Total credits		1,369,201.39

Construction cost and revenue, King Hill project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examinations and surveys		$20,092.80
Canal system:		
Four Mile flume		95,886.91
Wasteway at station 923		3,591.46
Road, Hillstones to Little Pilgrim	$28.98	27,162.06
Wood-stave flume		3,715.28
Gunite flume	362.27	15,097.08
Wasteway at station 1394	240.26	1,189.19
Canal enlargement		3,284.58
Canal surveys	950.35	15,927.16
Road, Little Pilgrim to headworks	573.14	19,812.09
One Mile flume, bell and spigot	881.51	121,687.80
Little Pilgrim siphon		31,093.79
Big Pilgrim siphon	3,308.17	58,584.75
Deer Gulch siphon	943.61	66,265.42
Wasteway near station 40	3,452.92	3,492.04
Regulating device, station 41	2,609.26	10,079.74
Siphon No. 1, betterments	661.58	677.07
Head End flume, contract		33,284.15
Head End flume, Government forces	199.38	41,760.22
Gunite lining, station 171		616.08
Gunite lining, station 170		1,057.55
Wasteway No. 2	2.69	2,755.92
One Mile flume without joints	220.12	24,135.41
Siphon at station 171		11,422.71
Tuanna siphon stations 382 to 388	41,642.37	41,948.91
Cassia siphon	39,811.71	40,062.74
Wasteway No. 7	2,370.52	2,412.42
Flume and wasteway No. 8	[1] 51.70	4,690.66
Wasteway No. 9	[1] 3.34	2,914.94
Concrete and gunite flume	950.41	81,965.60
Flume and trestle, station 811	[1] 53.40	4,366.69
Bridge at station 181		502.34
Big Pilgrim bridge		1,554.02
Snake River bridge, King Hill	2,735.12	3,433.05
Snake River bridge, Glenns Ferry		65.28
Combination lining and flume		7,098.82
Semiprecast flume	628.66	97,003.82
Repairs to canal lining, station 229	[1] 137.70	10,830.02
Repairs to canal lining, stations 719–727	[1] 28.17	2,244.00
Four Mile flume, stations 759–777	31,690.66	31,735.23
McEachern wood-stave flume	16,340.81	16,542.65
McEachern concrete flume	29,566.42	29,661.60
Wasteway No. 11, station 1174	8,950.68	9,003.75
Division gates, lateral No. 4	1,831.11	1,831.11
Concrete lining (Greer)	24,298.89	24,326.35
Combination lining and flume (Greer)	10,638.98	10,675.60
Lock-joint pipe siphon, stations 104–108	98.77	301.58
Slick concrete flume	1,785.61	2,059.94
Lock-joint pipe siphon, stations 301–305	75.82	197.96
Lock-joint pipe siphon, stations 325–329	164.33	222.99
Head End flume, stations 71–96	99,742.00	99,745.30
Little Alkali siphon	126.50	182.22
Big Alkali siphon		50.54
Cold Springs flume	415.20	622.30
Extension on McEachern siphon	4,436.00	4,454.31
Cold Springs flume wasteway	201.17	201.17
Total canal system	332,661.67	1,125,486.37
Lateral system:		
King Hill siphon	558.83	1,003.46
Lateral 6-E	44.38	130.11
Lateral 5-E	79.28	347.21
Total lateral system	682.49	1,480.78
Farm units, irrigable land	[1] 8.55	3,525.69
Permanent improvements:		
Lands purchased		1,117.60
Buildings	[1] 55.86	33,513.86
Total permanent improvements	[1] 55.86	34,631.46
Telephone system:		
King Hill line		7,874.97
Glenns Ferry line		385.80
Total telephone system		8,260.77

[1] Contra.

Construction cost and revenue, King Hill project—Continued.

Features.	Fiscal year 1921.	To June 30, 1921.
Operation and maintenance (during construction) canals and laterals	$8,350.01	$8,350.01
Unadjusted clearing	15,723.00	10,850.57
Total cost of construction features	357,352.76	1,212,678.45
Less revenues earned during construction:		
Rentals of buildings	2,090.89	6,031.51
Contractors' freight refunds	73.34	557.78
Miscellaneous revenues	24.48	636.99
Hospital operations	1,149.16	[1] 5,713.96
Rentals of irrigation water	3,811.78	3,811.78
Field cost adjustments	[1] 3,091.31	[1] 3,091.31
Total revenues	4,058.34	2,232.79
Grand total	353,294.42	1,210,445.66

[1] Contra.

Cost by calendar years.

	Construction.	Operation and maintenance during construction.	Total.
Year ending Dec. 31—			
1916	$1,687.94	.....	$1,687.94
1917	21,530.80	.....	21,530.80
1918	254,305.47	.....	254,306.47
1919	400,323.71	.....	400,323.71
1920	491,092.87	.....	491,092.87
Jan. 1 to June 30, 1921	35,387.65	$8,350.01	43,737.66
Total	1,204,328.44	8,350.01	1,212,678.45

Cost by fiscal years.

	Construction.	Operation and maintenance during construction.	Total.
Year ending June 30—			
1916	$738.39	.....	$738.39
1917	1,252.41	.....	1,252.41
1918	100,507.81	.....	100,507.81
1919	372,458.61	.....	372,458.61
1920	380,368.47	.....	380,368.47
1921	349,002.75	$8,350.01	357,352.76
Total	1,204,328.44	8,350.01	1,212,678.45

General expense.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance during construction.	Total.	Construction.	Operation and maintenance during construction.	Total.
Washington office	$8,370.99	$178.56	$8,555.55	$33,252.81	$178.56	$33,431.37
Project office	19,785.42	406.40	20,191.82	89,270.21	406.40	89,676.61
Denver office	3,325.58	75.96	3,401.54	15,629.37	75.96	15,705.33
District counsel's office	1,636.97	30.08	1,667.05	5,639.65	30.08	5,669.73
Other offices and miscellaneous	.....	.....	.....	4,648.43	.....	4,648.43
Total	33,124.96	691.00	33,815.96	148,440.47	691.00	149,131.47
Percentage of general expense to gross cost	9.5	8.3	9.5	12.4	8.3	12.3

IDAHO, MINIDOKA PROJECT.

BARRY DIBBLE, project manager, Burley, Idaho.

LOCATION.

Counties: Minidoka and Cassia, Idaho; Jackson Lake Reservoir, Lincoln, Wyo.

Townships: 8 to 11 S., Rs. 21 to 25 E., Boise meridian; Jackson Lake Reservoir, Tps. 44 to 46 N., Rs. 114 to 116 W., sixth principal meridian, Wyoming.

Railroad: Oregon Short Line.

Project towns and estimated population June 30, 1921: Rupert, 2,500; Heyburn, 300; Burley, 5,500; Paul, 600; Declo, 300; and Acequia, 50.

WATER SUPPLY.

Source of water supply: Snake River, supplemented by storage.

Area of drainage basin: 22,600 square miles above diversion dam.

Annual run-off in acre-feet of Snake River at Montgomerys Ferry and Neeley (16,000 square miles) 1896 to 1920: Maximum 8,600,000, minimum 4,146,000, mean 6,660,000. South Fork of Snake River at Moran, Wyo. (820 square miles), 1904 to 1920: Maximum 1,480,000, minimum 779,500, mean 1,140,500. The above record is based on the year October 1 to September 30.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1921: 121,557 acres.

Area under water-right application and rental contracts, season of 1921: 120,642 acres.

Length of irrigation season, April 1 to October 15 (198 days).

Average elevation of irrigable area: 4,225 feet above sea level.

Rainfall on irrigable area: 16 years' average, 11.71 inches; 1920, 9.41 inches.

Average temperature for past 16 years, maximum, 99° F.; minimum, −12.7° F.

Character of soil of irrigable area: On north side of river, sand and sandy loam predominate; about one-third of the area is clay loam; on south side of river the soil is a disintegrated ash.

Principal products: Alfalfa, grasses, wheat, oats, beet seed, clover seed, sugar beets, and potatoes.

Principal markets: Pocatello, Idaho; Salt Lake, Utah; Butte and Helena, Mont.; Portland, Oreg.; Kansas City, Mo.; Omaha, Nebr.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto (gravity unit): Public notices—March 9, 1907; November 23, 1908; February 11, March 30, 1909; February 7, March 22, June 10, October 13, November 3 and 25, 1910; January 23, December 30, 1911; March 21, 1912; June 23, 1913; September 24, 1914; February 27, March 20, 1915; March 4, May 4 and 27, June 10, 22, and 26, October 2, November 22, 1916; March 26, 1917. Orders—July 19, December 10, 1907; July 9, 1908; December 27, 1910; March 18 and 31, May 4, June 8, 1911; February 26, March 19 and 25, July 21, 1913; January 19, March 26 and 31, 1914; March 8 and July 13, 1915; April 7, June 26, 1916; March 23, 1917.

South Side Pumping Division: Public notices—November 3, 1915; May 25, 1916; April 10, 1917; April 2, 1918; March 4, 1920; February 18, 1921. Orders—March 24, 1911; March 19, May 13, October 10, 1912; March 25, 1913; March 23, 1914; March 1, 1915; March 23, 1917.

Location of lands opened: Tps. 8 to 11 S., Rs. 21 to 25 E., Boise meridian.

The 1920 operation and maintenance charge on the Gravity Division was fixed by the Minidoka Irrigation District at $2 per acre of irrigable land, for which from 2 to 8 acre-feet are delivered with a graduated charge for excess water used ranging from 10

to 30 cents per acre-foot. The district will not fix the rate for 1921 until December, 1921.

On the Pumping Division the rate for 1921 and thereafter until further notice, as set by public notice dated February 18, 1921, is 60 cents per acre-foot for all water used up to and including June 5 or after September 15 and on or before October 15, and $1.30 per acre-foot for water used after June 5 and on or before September 15, with a minimum charge of $2 per irrigable acre whether water is used thereon or not, which maximum charge will be applied in payment of the charges under the acre-foot rates.

CHRONOLOGICAL SUMMARY.

First surveys with reference to storage possibilities in 1902.
Reconnaissance and preliminary surveys for main project begun March, 1903.
Construction recommended by board of engineers March 21, 1904.
Construction authorized by Secretary April 23, 1904.
Minidoka Dam completed September, 1906.
Temporary dam on the Moran site, Jackson Lake, completed in 1907.
First irrigation by Reclamation Service season of 1907.
Jackson Lake Dam completed November 25, 1911.
Contract for enlargement of Jackson Lake Reservoir entered February 25, 1913.
Enlargement of Jackson Lake Reservoir completed December, 1916.
Gravity Division 99.7 per cent completed June 30, 1921, including drainage.
South Side Pumping Division 95.1 per cent completed June 30, 1921.
Jackson Lake storage 100 per cent completed June 30, 1921.
Commercial unit 33 per cent completed June 30, 1921.
Entire project (except extensions) 91.9 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Minidoka project provides for the diversion of the waters of the Snake River by a combined storage, diversion, and power dam about 6 miles south of Minidoka, Idaho, into two canal systems, one on either side of the river, watering lands in the vicinity of Acequia, Rupert, Heyburn, Paul, Declo, and Burley, Idaho. Power developed at the dam is utilized primarily for pumping water from the canals to irrigate high lands. Use of it is also made for pumping for drainage purposes and for lights, motors, domestic appliances of all kinds, heaters, and other apparatus in the towns and on the farms of the project. The United States claims all waste, seepage, spring and percolating water arising within the project, and proposes to use this water in connection therewith. Storage for the project is provided mainly by a reservoir constructed in the upper drainage basin of Snake River, at Jackson Lake, Wyo. This is supplemented by the reservoir formed by the Minidoka Dam and known as Lake Walcott. Jackson Lake Dam and Minidoka Dam are completed. Jackson Lake Dam has been raised 17 feet above its original height and the river channel below the dam deepened, making the available storage capacity of the reservoir 847,000 acre-feet. Lake Walcott has an available storage capacity of 95,000 acre-feet. The irrigation system for the Gravity Division and the South Side Pumping Division, and the drainage system for the Gravity Division have been completed.

SUMMARY OF GENERAL DATA FOR MINIDOKA PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is completed		121,557
Public land entered to June 30, 1921	96,357	
Public land open to entry on June 30, 1921	343	
State land unsold, June 30, 1921	28	
Other private land June 30, 1921	24,829	
Acreage Service could have supplied in season of 1920		121,557
Estimated acreage Service can supply in season 1921		121,557
Estimated acreage Service can supply in season 1922		121,557
Acreage irrigated season of 1920		107,650
Acreage cropped under irrigation season of 1920		98,580
Crops:		
Value of irrigated crops season of 1920		$4,047,200.00
Value of irrigated crops per acre cropped		41.05

Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$317,000.00	
Unencumbered balance of previous appropriations	730,810.06	
Miscellaneous collections and transfers issued	183,906.88	
Increase of compensation	26,328.95	
Total amount authorized		$1,258,045.89
Encumbrances—		
Disbursements and transfers received	533,519.70	
Current liabilities	101,325.18	
Contingent liabilities	13,050.00	
Increase of compensation	26,328.95	
Total encumbrances		674,223.83
Unencumbered balance on July 1, 1921		583,822.06
Fiscal year 1922—		
Amount specified in appropriation act		1,735,000.00
Fiscal year 1923—		
Proposed appropriation		1,250,000.00
Inventories:		
Value of stock on hand		60,086.21
Value of plant and equipment in use		16,217.34
Construction cost and per cent completed:		
Gross cost to June 30, 1921	[1] 7,282,553.65	
Less revenues and adjustments	212,664.08	
Net cost to June 30, 1921		7,069,889.57
Value of construction water-right contracts and other resources to repay net cost of project		7,196,830.63
Revenues held in reserve		45,449.79
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	1,163,469.32	
Less charges due and miscellanous revenues	1,183,904.33	
Excess		20,435.01
Drainage:		
Total cost of drainage works to June 30, 1921		$749,429.74
Miles of open drain built to June 30, 1921		109
Estimated acreage damaged by seepage on June 30, 1921		560
Estimated acreage protected by drains on June 30, 1921		30,000
Estimated acreage to be protected by authorized system		30,000

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges:						
Gravity Division	$904,794.32	$687,759.29	.....	$153,341.49	$841,100.78	$63,693.54
South Side Pumping	311,826.04	246,713.48	.....	.....	246,713.48	65,112.56
Jackson Lake	168,990.54	166,317.91	.....	.....	166,317.91	2,672.63
American Falls	1,575.00	1,575.00	.....	.....	1,575.00	.....
Total construction charges	1,387,185.90	1,102,365.68	.....	153,341.49	1,255,707.17	131,478.73
Operation and maintenance charges:						
Gravity Division	485,236.93	374,598.15	$1,076.97	50,294.97	425,970.09	59,266.84
South Side Pumping	560,755.62	382,175.67	13,840.82	.....	396,016.49	164,739.13
Jackson Lake	70,387.13	70,001.39	.....	.....	70,001.39	385.74
Total operation and maintenance charges	1,116,379.68	826,775.21	14,917.79	50,294.97	891,987.97	224,391.71
Supplemental construction to be paid as operation and maintenance and gravity	78,986.14	78,096.73	249.17	.....	78,345.90	640.24
Rentals, irrigation water	262,257.38	258,915.01	.....	3,234.23	262,149.24	108.14
Rentals, power	463,825.96	431,569.36	.....	4,799.44	436,368.80	27,457.16
Rentals, grazing and farming lands	31,632.62	27,793.16	.....	.....	27,793.16	3,839.46
Contractors' freight refunds	1,108.36	1,089.33	.....	.....	1,089.33	19.03
Miscellaneous	40,383.46	39,461.95	.....	.....	39,461.95	921.51
Total	799,207.78	758,828.81	.....	8,033.67	766,862.48	32,345.30
Grand total	3,381,759.50	2,766,066.43	15,166.96	211,670.13	2,992,903.52	388,855.98

	Cost.	Per cent completed.
[1] Gravity	$2,873,125.14	99.7
S. S. Pumping	2,760,563.37	95.1
Jackson L.	911,270.10	100
Coml. Power	205,933.09	33
New divisions	113,696.44	
American Falls	410,011.79	3
Undistributed	7,953.72	
Total	7,282,553.65	91.9

CONSTRUCTION DURING FISCAL YEAR.

Gravity Division.—This division is under the control of the Minidoka Irrigation District. No construction work was done by the Reclamation Service during the year.

South Side Pumping Division.—The B line, extending from the Minidoka power house to pumping station No. 2, was restrung with No. 1 copper conductor. The No. 5 copper conductor removed was used in the construction of the Milner transmission line. The heavier copper eliminates 200 kilowatts of the loss of electrical energy in transmission to the South Side pumping stations. A 44,000-volt, 3-phase transmission line was built between Burley and Milner, Idaho, for the purpose of securing additional power for the Minidoka project. Under a contract dated April 1, 1921, the Idaho Power Co. undertakes to transmit from Boise to Milner and deliver to the United States at that point one-half the output of the Government power house at the Boise River Diversion Dam. A substation of 2,000 kilovolt-ampere capacity, with voltage of 44,000 to 30,000, was constructed for the purpose of tying together the Idaho Power Co. system and the Minidoka project system. The Burley substation was enlarged from 2,250 kilovolt-ampere to 3,600 kilovolt-ampere capacity. Material and equipment for increasing the capacity of the Rupert substation from 1,500 kilovolt-ampere to 2,100 kilovolt-ampere is on hand.

North Side Pumping Division.—Topographic surveys were carried on until September 15, 1920, and after April 1, 1921. The area covered during the year was 21,500 acres, making the total at the end of the fiscal year 142,778 acres, including 680 acres in the Acequia extension. Sixty-one miles of level control were completed, making a total of 546 miles.

American Falls Reservoir.—A large amount of preliminary work was done on surveys and the appraisal and acquisition of rights of way. A topographic survey of the entire reservoir area, amounting to about 85,000 acres, was completed on a scale of 400 feet to an inch. Detailed topography, on a scale of 40 feet to an inch, was taken over the site of the proposed dam. A tract of land was purchased as a site for the new town to replace the present town of American Falls, most of which will be submerged when the reservoir is built. A topographic survey was made of the new site and it was cleared of sagebrush. Detailed plans of the new town were being prepared at the end of the year.

Numerous test wells and pits were sunk to determine the character of foundation of the proposed dam. A number of wells were also put down around the edge of the reservoir for examining the rate and direction of flow of underground water.

Appraisals were well under way on the property in the town of American Falls and on the rural property within the reservoir. Purchases of right of way included 69 contracts at a cost of $202,721.11.

COMMERCIAL POWER.

In spite of the low crop prices in the fall of 1920 the sale of electric energy continued to increase, and the gross revenue from that source was $113,000 as compared with $93,700 in the fiscal year 1920, an increase of 21 per cent. There has been a falling off in

the use of electricity for heating in the principal towns owing in part to a large increase in the price of electricity for that purpose and in part to a mild winter.

A survey of the load connected to the commercial lines on the project was made as of January 1, 1921, from which tables have been prepared to give some idea of the extent and nature of the uses to which the electricity available is being put. The accompanying table shows the connected load on lines of the principal contractors and the contractors' installation for supplying it. This is in addition to the Government transmission system and to the pumping and other requirements of the Reclamation Service.

Connected load and equipment installed Jan. 1, 1921.

Contractor.	Consumers connected.	Connected load.					Maximum demand.	2,200-volt circuits.	Distribution transformers.
		Lights.	Appliances, including motors up to 2 horse power.	Motors, 2 horse power and larger.	Heaters.	Total.			
		Kilowatts.	*Kilowatts.*	*Kilowatts.*	*Kilowatts.*	*Kilowatts.*	*Kilowatts.*	*Miles.*	*Kilowatts.*
Amalgamated Sugar Co	1	19.300	12.510	178.125	13.7	223.635	163.20	0.30	90
Minidoka N. S. P. Co.	31	14.725	27.815	12.750	20.8	76.090	33.20	8.40	60
Paul Electric Co	292	147.370	293.835	157.125	121.0	719.330	336.00	26.40	573
Farmers Electric Co	6	2.095	4.630	7.500	.....	14.225	10.00	1.20	18
Schodde Electric Co	13	4.545	12.685	18.750	.....	35.980	10.80	3.80	40
Village of Albion	143	68.520	295.165	37.875	285.0	686.560	340.00	13.20	510
Acequia Dairy & P. Co	38	13.150	19.520	3.000	.....	35.670	12.20	8.60	48
Minidoka Irrig. Dist	7	4.370	16.100	305.250	23.0	348.720	251.90	.....	476
Rural Electric Co	73	37.000	76.340	1.500	64.0	178.840	88.80	21.40	150
Unity Light & P. Co	197	89.955	191.885	60.750	.....	342.590	48.00	45.80	240
West End Power Co	7	5.000	8.500	1.500	.....	15.000	3.80	1.10	12
M lcher M. & M.Co	1	9.150	20.415	233.250	.....	262.815	.....	1.70	150
F uitland Drive P.Co.	7	3.850	2.365	3.750	.....	9.965	5.80	1.15	11
North Heyburn Electric Co	7	2.600	4.625	.....	.....	7.225	2.40	1.50	9
Riverside Electric Co.	67	32.385	46.600	2.250	.....	81.235	18.00	19.40	97
East End Electric Co.	90	40.975	69.005	4.500	.....	114.480	26.80	22.90	125
Declo Light & P. Co	50	21.975	53.050	18.000	.....	93.025	21.20	16.25	85
Central Electric Co	28	13.135	20.195	.....	.....	33.330	8.40	7.50	35
West Budge P. Co	15	7.675	10.770	11.250	.....	29.695	3.60	4.50	32
Walcott Electric Co	16	9.755	11.490	1.500	.....	22.745	6.40	5.90	23
Ferry Light & P. Co	75	39.630	67.165	27.000	.....	133.795	31.20	18.60	99
Matthews Bros	4	4.425	11.145	.....	.....	15.570	2.00	.50	12
Empire Electric Co	6	2.350	4.445	.....	.....	6.795	2.40	1.20	8
Top Notch Electric Co	9	4.720	7.845	1.500	.....	14.065	2.00	4.00	13
Portland Feeder Co	1	520	.....	39.000	.....	39.520	67.20	.....	60
City of Burley	1,142	628.680	2,107.865	699.370	2,255.0	5,690.915	3,100.00	21.80	3,368
City of Rupert	651	403.475	745.930	305.630	1,465.0	2,920.035	2,160.00	19.00	2,802
Village of Heyburn	74	33.345	34.785	31.870	98.0	199.000	160.00	6.80	153
G. M. Dewey	5	8.200	10.295	10.500	.....	28.995	6.40	4.40	17
Village of Declo	94	59.120	74.755	35.630	.....	169.505	50.40	11.50	185
Small contracts	37	21.290	51.050	7.500	30.0	109.840	37.42	14.35	90
Totals	3,187	1,753.285	4,313.780	2,216.625	4,375.5	12,659.190	7,009.52	313.15	9,591
Per cent increase or decrease during 1920.	17	18	20	2	−23	−2	−4	12	15

The accompanying table shows the variety of the smaller appliances in use. The great preponderance of appliances of a practical labor-saving character is an interesting feature.

Electric appliances in use Dec. 31, 1920, not including those classed as lamps, motors, or heaters.

Item.	Number.	Load.	Increase during 1920.
		Watts.	*Per cent.*
Flatirons	2,210	1,215,500	19
Washing machines	1,034	170,610	18
Hot plates, grills, toasters	623	415,115	13
Motors smaller than 2 horsepower	384	242,590	18
Vacuum cleaners	310	31,000	17
Ranges	246	1,342,035	20
Fans	184	16,490	.....
Water heaters	180	62,000	24
Percolators	115	57,500	7
Sewing machines	89	4,450	.....
Air warmers	63	62,000	6
Heating pads	55	3,300	28
Curling irons	39	780	8
Adding machines	31	2,750	6
Coffee urns (restaurant size)	19	19,300	−6
Sterilizers (surgeon's)	21	47,080	6
Moving-picture machines	15	40,000	.....
Bake ovens	7	74,850	.....
Miscellaneous	314	188,265	11
Total	6,047	4,313,780	20

SEEPAGE AND DRAINAGE.

The drainage system on the Gravity Division continued under the control of the Minidoka Irrigation District. The discharge from all the drains during the year 1920, according to the records of the district, was 79,333 acre-feet. This shows an increase of 3,875 acre-feet over the discharge of 75,458 acre-feet for 1919.

The total amount of water delivered to the project through the Main North Side Canal in 1920 was 447,735 acre-feet and in 1919 it was 389,128 acre-feet. It is interesting to note that from one-fifth to one-sixth of all water delivered to the project is carried off through the drains.

ECONOMIES OF GOVERNMENT WORK.

One of the principal items of cost of operation on the Minidoka project has been the removal of moss from the canals during the irrigation season. The moss reaches its greatest growth usually during the peak of demand for water and it is essential that the moss be removed as quickly as possible.

Heretofore this has been done in three ways: (1) By mowing with scythes, (2) by dragging with chains, (3) by cutting with specially designed moss saws.

All of these methods are slow and expensive. In the spring of 1921, however, a kind of disk harrow was adopted which gives very satisfactory results. This machine consists of two sets of disks mounted on shafts which are attached to each other, end to end, and can be adjusted to any angle. By using shafts of different lengths, the width of machine can be changed as desired. The machine is pulled up and down the canal by a chain hitched to horses traveling on either bank, and with proper adjustment of this chain the disk can be made to travel in any part of the canal. The disk removes not only the moss but any accumulated silt.

It is estimated that such a machine will cover about a mile of canal varying from 20 to 30 feet wide in a day at a cost of a little

more than $20. This is double the speed that can be attained by any other method and at a reduction in cost of from 25 to 35 per cent.

BOARD MEETINGS.

Date.	Subject.	Personnel.
July 20, 1920	American Falls Reservoir	A. P. Davis, F. E. Weymouth, B. E. Stoutemyer, Barry Dibble, R. M. Patrick, J. M. Gaylord, and F. A. Banks.

OPERATION AND MAINTENANCE.

Gravity Division.—This division continued to be operated by the Minidoka Irrigation District under the terms of the contract of December 2, 1916. A thorough cleaning of the canal and lateral system was made in the fall of 1920 and the spring of 1921. Water was turned out of the Main North Side Canal on October 3, 1920, and turned in on March 15, 1921.

South Side Pumping Division.—This division continued to be operated by the United States Reclamation Service. The usual cleaning of canals was carried on during the fall of 1920 and the spring of 1921, in preparation for the irrigation season of 1921. The South Side pumping stations were closed down on October 14, 1920, and were started up on April 28, 1921.

General.—Although Jackson Lake did not fill in 1920, the maximum storage amounting only to 746,280 acre-feet, the precipitation over the Snake River watershed was sufficient to give a good supply of natural-flow water. In consequence, the use of stored water did not begin until July 8, 1920, and on September 16 Jackson Lake gates were closed with 126,120 acre-feet remaining in the reservoir. On June 19, 1921, the reservoir was filled to its capacity of 847,000 acre-feet, and more than 135,000 acre-feet were wasted over the spillway of the dam during the month.

Historical review, Minidoka project, by calendar years.

	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	120,000	120,300	120,852	121,000	121,392	121,557
Acreage irrigated	83,562	89,900	99,020	105,062	104,259	107,650
Miles of canal operated	590	615	633.19	634.37	634.60	634.60
Water diverted (acre-feet)	609,434	640,432	616,228	745,821	626,645	734,428
Water delivered to land (acre-feet)	323,479	334,649	305,278	390,903	349,012	383,766
Per acre of land irrigated (acre-feet)[1]	3.9	3.7	3.1	3.7	3.3	3.6

[1] Partially estimated.

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 21.

SETTLEMENT.

The slump in financial conditions that occurred in the latter part of 1920 had a marked effect on farm operations. The high wages

which the farmer paid during 1919 continued through practically the entire year of 1920. The prices for farm products, however, dropped far below those of the preceding year. As a result, the margin of profit to the farmer for his year's work was greatly reduced if not entirely wiped out. In a few cases, where farms had been bought at high prices with a small first payment, the buyers were unable to meet subsequent payments and were compelled to give up their holdings. In the spring of 1921, however, there was a general reduction in wages which will tend to equalize the cost of operating the farm and the returns from it. There was only a small amount of building during the year. At Burley an eight-room modern brick schoolhouse was completed, and one business block and a few residences were erected. At Rupert a business block and some residences were built. A system of sidewalks, covering all portions of the town, was completed in the latter town. The building of gravelled roads on both the gravity and pumping divisions was continued by the several highway districts, and in the Paul and Rupert districts the systems as laid out were practically completed.

Settlement data, Minidoka project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Total number of farms on project	2,164	2,322	2,327	2,340	2,353	2,420
Population	5,800	6,468	7,467	8,490	9,029	9,177
Number of irrigated farms	1,713	1,760	2,195	2,208	2,353	2,420
Operated by owners or managers	1,402	1,352	1,725	1,556	1,877	1,863
Operated by tenants	311	408	470	652	476	557
Population	5,800	5,800	7,467	8,490	9,029	9,250
Number of towns	5	5	6	6	6	6
Population	3,500	4,100	5,300	6,600	8,500	9,000
Total population towns and farms	9,300	10,568	12,767	15,090	17,529	18,250
Number of public schools	21	21	20	21	28	26
Number of churches	21	21	25	25	25	29
Number of banks	6	6	6	8	8	10
Total capital stock	$140,000	$140,000	$165,000	$240,000	$260,000	$345,000
Amount of deposits	$821,909	$1,311,641	$2,522,764	$2,543,343	$3,725,691	$3,860,744
Number of depositors	4,721	6,570	7,350	10,663	11,086	12,725

PRINCIPAL CROPS.

Alfalfa continued to be the leading crop grown on the project. Its area on the gravity division was 28,568 acres out of a total cropped of 55,640 acres, or more than 50 per cent; on the pumping division there were 18,354 acres of alfalfa out of a total of 42,940 acres, or nearly 45 per cent. The total alfalfa acreage therefore was 46,922 acres; an increase of 357 acres over the 1919 crop. Wheat was second in area with 17,011 acres on the entire project. Beets, with an area of 8,200 acres, and potatoes, with an area of 6,619 acres, were, respectively, third and fourth in importance. Beets showed a decrease of 217 acres below that of 1919, and potatoes an increase of 1,004 acres. The average crop value on the gravity division was $35 and on the pumping division $49 per acre. The value of the crop grown on the gravity division was $1,948,000 and on the pumping division $2,099,200 or a total of $4,047,200 for the entire project.

Crop report, Gravity Division, Minidoka project, Idaho, 1920.

[Data furnished by Minidoka Irrigation District.]

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Average per unit of yield.	Total.	Average per acre.
Alfalfa hay	28,568	Ton	98,464	3.5	$7.00	$689,220	$24.13
Alfalfa seed	484	Bushel	1,770	3.7	9.00	15,936	32.90
Apples	139	...do	11,784	84.7	1.50	17,676	127.08
Barley	1,102	...do	39,639	36	.80	31,711	28.77
Beans	29	...do	460	16	3.00	1,380	48.04
Beets, sugar	3,943	Ton	34,098	8.7	12.00	409,160	103.77
Beets, mangel	9	...do	88	9.8	5.00	440	48.88
Clover hay	846	...do	1,523	1.8	8.00	12,187	14.40
Clover seed	1,245	Bushel	4,744	3.8	11.40	54,084	43.42
Corn, Indian	799	...do	23,922	29.9	1.00	23,923	29.94
Corn fodder	194	Ton	1,491	7.68	5.00	7,455	38.43
Small fruit	20	Pound	127,752	6,308.7	.03	3,832	189.26
Garden	656			79.47		52,160	79.47
Common hay	202	Ton	421	2.1	5.00	2,108	10.43
Oats	3,463	Bushel	141,088	40.8	.45	63,490	18.33
Onions	36	...do	4,515	127.2	1.00	4,515	127.18
Pasture	5,054					66,716	13.20
Potatoes	1,917	Bushel	332,395	173.4	.60	199,420	104.03
Rye	132	...do	1,736	13.2	1.50	2,604	19.73
Wheat	7,644	...do	240,259	31.4	1.20	288,300	38.00
Miscellaneous	32					1,683	52.84
Less irrigated, but no crop	406						
Less duplicated areas	468						
Total cropped	55,640	Total and average				1,948,000	35.00

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:					
Nonbearing orchard	379				
Irrigated, no crop	406				
Young alfalfa	3,697				
Fall plowed and miscellaneous	2,450	Area occupied by town sites	615		
Less duplicated areas	1,052	Total irrigable area farms reported	71,477	1,514	
Total irrigated	61,520	Total irrigated area farms reported	61,520		85.4
		Under water-right applications	72,093		
		Total cropped area farms reported	55,640		77.2

Crop report, South Side Pumping Division, Minidoka project, Idaho, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	18,354	Ton	52,518	2.9	$7.00	$367,506	$20.00
Alfalfa seed	225	Bushel	751	3.3	9.00	6,758	30.00
Apples	99	Pound	49,135	495	.02½	1,228	12.40
Barley	834	Bushel	30,036	36.2	.80	24,028	28.81
Beets	4,257	Ton	41,378	9.7	12.00	496,440	116.64
Beans	5	Bushel	65	13	3.00	195	39.00
Clover	109	Ton	163	1.5	8.00	1,304	12.00
Clover seed	760	Bushel	2,869	3.8	12.00	34,428	45.30
Corn	84	...do	930	11.1	1.00	930	11.07
Corn fodder	44	Ton	167	3.8	5.00	835	19.00
Fruits, small	12	Acre				1,175	98.00
Garden	324	...do				25,245	78.00
Hay	30	Ton	27	0.9	5.00	135	4.50
Mangels	10	...do	137	13.7	5.00	685	68.50
Onions	5	Bushel	1,700	340	1.00	1,700	340.00
Oats	1,724	...do	58,330	33.8	.45	26,202	15.22
Pasture	2,114	Acre				37,090	17.54
Potatoes	4,702	Bushel	1,194,557	254	.60	715,621	152.22
Peas	5	...do	187	37.5	1.50	280	56.00
Rye	6	...do	28	4.7	1.50	42	7.00
Wheat	9,367	...do	297,861	31.8	1.20	357,373	38.00
Less duplicated areas	130						
Total cropped	42,940	Total and average				2,099,200	49.00

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:					
Nonbearing orchard	196				
Young alfalfa	1,794				
Young clover	160				
Miscellaneous	1,922				
Less duplicated areas	882	Total irrigable area farms reported	48,448	915	99.9
Total irrigated	46,130	Total irrigated area farms reported	46,130	915	94.5
		Under water right applications	46,130	915	94.5
		Total cropped area farms reported	42,940	915	87.8

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, FEBRUARY 18, 1921.

Annual operation and maintenance charges.—In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1921, and thereafter until further notice, against all lands of the South Side Pumping Division, Minidoka project, Idaho, under public notice, shall be as follows: Sixty cents per acre-foot for all water delivered on or before June 5; $1.30 per acre-foot for all water delivered after June 5 and on or before September 15, and 60 cents per acre-foot for all water delivered after September 15 and on or before October 15: *Provided, however,* That there shall be a minimum charge of $2 against each irrigable acre whether water is used thereon or not, which minimum charge will be applied in payment of the charges under the acre-foot rates.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Minidoka project, June 30, 1921.

DEBITS.

Collections on hand in special deposit			$9,514.90
Inventory of materials and supplies on hand			60,086.21
Plant and equipment in use			16,217.24
Current accounts receivable			388,855.98
Construction charges not due			4,615,653.94
Unearned value of contracts			13,050.00
Construction cost of works		$6,941,932.17	
Operation and maintenance added to construction		12,313.86	
Operation and maintenance during construction		330,353.90	
Unadjusted clearing accounts		7,953.72	
Gross construction cost		7,282,553.65	
Less revenues and adjustments during construction period		212,664.08	
Net construction cost			7,069,889.57
Operation and maintenance cost under public notice		1,231,595.65	
Less operation and maintenance added to construction		12,313.86	
Gross operation and maintenance cost		1,219,281.79	
Less revenues and adjustments		1,200,839.02	
Excess to Dec. 31, 1921	$20,435.01		
Net cost Jan. 1 to June 30, 1921	38,877.78		
			18,442.77
Investment items in transit			2,221.23
Total debits			12,193,931.94

CREDITS.

Current accounts payable			101,332.21
Contingent and deferred liabilities			22,564.90
Resources for repaying cost of project			7,196,830.63
Revenues held in reserve			45,449.79
Investment:			
Disbursements and transfer from other projects	$8,864,035.67		
Items in transit	2,236.59		
Total		8,866,272.26	
Less collections and transfers to other projects	4,038,502.49		
Items in transit	15.36		
Total		4,038,517.85	
Net investment			4,827,754.41
Total credits			12,193,931.94

Construction cost and revenue, Minidoka project.

Feature.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys	$12,313.09	$164,802.20
Storage:		
Jackson Lake Dam		1,193,083.82
Jackson Lake Bridge		33,316.89
Deepening river channel		44,000.08
American Falls Reservoir	408,440.88	408,440.88
Total storage	408,440.88	1,678,841.67
Pumping for irrigation:		
Five small pumping stations gravity unit		29,521.47
South Side pumping stations		474,047.96
Total pumping for irrigation		503,569.43
Canal system:		
Minidoka Dam		676,575.37
Main North Side Canal		746,154.58
Main South Side Canal		329,579.88
Feeders to South Side pumping stations		77,489.85
Total canal system		1,829,799.68
Lateral system:		
Gravity Division		540,651.95
South Side Pumping Division		577,332.21
Total lateral system		1,117,984.16
Drainage system		749,429.74
Power system:		
Power house		455,317.40
Transmission lines	26,570.79	130,078.92
Substations	44,670.62	123,770.40
American Falls	1,570.91	1,570.91
Total power system	72,812.32	710,737.63
Permanent improvements and lands:		
Buildings		130,784.44
Potato cellars		11,003.05
Roads		1,533.87
Jackson Lake enlargement		2,396.07
Total permanent improvements on lands		145,720.43
Telephone system:		
Minidoka project		28,396.01
Jackson Lake enlargement		2,651.22
Total telephone system		31,047.23
Operation and maintenance during construction, water-rental basis		330,353.90
Operation and maintenance added to and compounded with construction		12,313.86
Unadjusted clearing accounts	7,953.72	7,953.72
Gross construction cost	501,520.01	7,282,553.65
Less revenues earned during construction:		
Rental of buildings	6,492.90	27,309.31
Rental of farming and grazing land	25.00	25.00
Rental of irrigation water	25,534.80	172,383.87
Contractors' freight refunds	19.03	1,108.36
Other revenues unclassified	475.98	11,781.62
Cooperation for food conservation	[1] 1,272.65	[1] 764.33
Doubtful accounts	142.54	226.91
Profit on hospital operation	776.56	1,530.90
Field cost adjustments	[1] 583.60	[1] 937.56
	31,610.56	212,664.08
Net construction cost to June 30, 1921	469,909.45	7,069,889.57

[1] Contra.

The above figures to June 30, 1921, include the cost of Jackson Lake enlargement, $782,045.87, and revenue $1,984.21, transferred to Minidoka project during fiscal year 1921.

Operating costs and revenues, Minidoka project.

Features.	Calendar year 1920.			To end of calendar year 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Storage:						
North Side Gravity	$6,722.65	$949.23	$7,671.88	$61,920.69	$3,291.48	$65,212.17
South Side Pumping	1,543.93	478.12	2,022.05	10,999.21	1,641.97	12,641.18
Jackson Lake, other companies	9,454.81	2,928.09	12,382.90	45,563.54	8,811.91	54,375.45
Jackson Lake, raising and blanketing dike	.....	[1] 1,447.89	[1] 1,447.89	.....	0.00	0.00
New units	993.78	308.24	1,302.02	993.78	308.24	1,302.02
Total storage system	18,715.17	3,215.79	21,930.96	119,477.22	14,053.60	133,530.82
Pumping:						
North Side Gravity	.....	.....	.....	3,826.62	1,413.31	5,239.93
South Side Pumping	13,665.29	8,294.01	21,959.30	82,057.76	52,474.05	134,531.81
Central stations and transmission lines	8,122.71	4,464.25	12,586.96	45,599.94	20,376.55	65,976.49
Total pumping	21,788.00	12,758.26	34,546.26	131,484.32	74,263.91	205,748.23
Canals:						
Main Canal, North Side	1,426.23	866.07	2,292.30	38,341.03	73,717.91	112,058.94
Main Canal, South Side	2,185.28	5,645.64	7,830.92	9,852.20	24,778.38	34,630.58
Minidoka Dam, North Side	2,989.02	510.71	3,499.73	14,389.49	15,726.17	30,115.66
Minidoka Dam, South Side	910.09	351.99	1,262.08	4,563.95	5,010.56	9,574.51
Total canal system	7,510.62	7,374.41	14,885.03	67,146.67	119,233.02	186,379.69
Laterals:						
North Side distribution	.....	.....	.....	105,575.68	211,151.38	316,727.06
South Side distribution	22,217.16	59,875.26	82,092.42	95,742.33	225,341.19	321,083.52
Total lateral system	22,217.16	59,875.26	82,092.42	201,318.01	436,492.57	637,810.58
Total cost	70,230.95	83,223.72	153,454.67	519,426.22	644,043.10	1,163,469.32
Less operation and maintenance charges added to construction	.....	.....	.....	.....	.....	12,313.86
Balance	70,230.95	83,223.72	153,454.67	519,426.22	644,043.10	1,151,155.46
REVENUES.						
Operation and maintenance repayment under contracts with water users:						
Charges due	.....	.....	$213,323.32	.....	.....	$1,088,963.11
Forfeitures	.....	.....	[1] 2,251.07	.....	.....	.....
Payments advanced	.....	.....	54.60	.....	.....	54.60
Interest and penalties	.....	.....	580.81	.....	.....	6,496.78
Water rentals	.....	.....	.....	.....	.....	88,177.67
Rentals of lands and buildings	.....	.....	.....	.....	.....	1,027.11
Other revenues unclassified	.....	.....	87.68	.....	.....	218.99
Discounts	.....	.....	[1] 2,855.47	.....	.....	[1] 13,347.79
Total revenues	.....	.....	208,939.87	.....	.....	1,171,590.47
Difference, excess	.....	.....	55,485.20	.....	.....	20,435.01

[1] Contra.

Cost by calendar years, Minidoka project.

	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
Year ending June 30—								
1903	$26,111.96			$26,111.96				$26,111.96
1904	83,053.65			83,053.65				83,053.65
1905	505,805.94			505,805.94				505,805.94
1906	736,028.48			736,028.48				736,028.48
1907	439,598.02			439,598.02	$25,510.51		$25,510.51	465,108.53
1908	367,628.31			367,628.31	35,279.52		35,279.52	402,907.83
1909	731,680.54		$22,084.23	753,764.77	37,485.35		37,485.35	791,250.12
1910	599,919.79		57,654.75	657,574.54	48,043.74		48,043.74	705,618.28
1911	391,497.01		51,010.78	442,507.79	36,515.54		36,515.54	479,023.33
1912	307,484.75		68,250.72	375,735.47	41,239.03		41,239.03	416,974.50
1913	437,082.17		69,894.50	506,976.67	46,271.39		46,271.39	553,248.06
1914	894,154.81		61,458.92	955,613.73	69,496.97		69,496.97	1,025,110.70
1915	410,989.65			410,989.65	138,114.59		138,114.59	549,104.24
1916	247,232.90			247,232.90	163,080.89		163,080.89	410,313.79
1917	72,931.31	$12,313.86		85,245.17	126,960.56	$12,313.86	114,646.70	199,891.87
1918	68,667.65			68,667.65	98,776.71		98,776.71	167,444.36
1919	113,927.18			113,927.18	143,239.85		143,239.85	257,167.03
1920	49,442.58			49,442.58	153,454.67		153,454.67	202,897.25
Jan. 1 to June 30, 1921	456,649.19			456,649.19	68,126.33		68,126.33	524,775.52
Total	6,939,885.89	12,313.86	330,353.90	7,282,553.65	1,231,595.65	12,313.86	1,219,281.79	8,501,835.44

Above includes Jackson Lake enlargement.

Cost by fiscal years, Minidoka project.

Year ending June 30—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1903	$8,849.33			$8,849.33				$8,849.33
1904	34,525.27			34,525.27				34,525.27
1905	131,582.02			131,582.02				131,582.02
1906	880,029.87			880,029.87				880,029.87
1907	592,027.09			592,027.09				592,027.09
1908	287,168.95			287,168.95	$39,911.00		$39,911.00	327,079.95
1909	641,398.19			641,398.19	44,395.26		44,395.26	685,793.45
1910	628,646.68		$55,847.50	684,494.18	52,618.63		52,618.63	737,112.81
1911	494,399.14		56,503.60	550,902.74	34,011.52		34,011.52	584,914.26
1912	321,014.35		65,795.47	386,809.82	33,412.14		33,412.14	420,221.96
1913	286,766.50		64,294.23	351,060.73	40,222.57		40,222.57	391,283.30
1914	915,449.02		70,305.60	985,754.62	71,558.08		71,558.08	1,057,312.70
1915	536,927.60		17,607.50	554,535.10	102,871.27		102,871.27	657,406.37
1916	297,625.74			297,625.74	144,464.02		144,464.02	442,089.76
1917	130,402.58	$12,313.86		142,716.44	140,220.66	$12,313.86	127,906.80	270,623.24
1918	93,452.43			93,452.43	102,211.41		102,211.41	195,663.84
1919	134,613.21			134,613.21	123,176.84		123,176.84	257,790.05
1920	23,487.91			23,487.91	146,323.48		146,323.48	169,811.39
1921	501,520.01			501,520.01	156,198.77		156,198.77	657,718.78
Total	6,939,885.89	12,313.86	330,353.90	7,282,553.65	1,231,595.65	12,313.86	1,219,281.79	8,501,835.44

Above includes Jackson Lake enlargement.

General expense, Minidoka project.

	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Project	$6,684.25	$11,061.93	$17,746.18	$222,462.09	$167,380.54	$389,842.6 3
Washington office Denver office District counsel	6,929.70	15,490.10	22,419.80	191,891.33	124,540.57	316,431.90
Total	13,613.95	26,552.03	40,165.98	414,353.42	291,921.11	706,274.53
Percentage of general expense to gross cost	2.7	16.9	6.1	6	18.7	8.3

Includes general expense charged to Jackson Lake enlargement.

MONTANA, HUNTLEY PROJECT.

A. R. McGinness, Project Manager, Ballantine, Mont.

LOCATION.

County: Yellowstone.

Townships: 2 and 3 N., Rs. 27 to 31 E., Montana meridian.

Railroads: Northern Pacific; Chicago, Burlington & Quincy.

Project cities and towns and estimated population June 30, 1921: Huntley, 150; Osborn;[1] Worden, 175; Pompeys Pillar, 120; Ballantine, 175; Anita;[1] and Nibbe;[1] Mont.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre-feet of Yellowstone River at Huntley (12,000 square miles), 1908 to 1919: Maximum, 7,391,000; minimum, 4,562,000; mean, 6,092,400. No available data for 1920.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1920: 31,265 acres.

Area under water-right application, season of 1920: 28,197 acres.

Length of irrigation season: May 1 to September 30—153 days.

Average elevation of irrigable area: 3,000 feet above sea level.

Rainfall on irrigable area: 14 years, average 13.06 inches; 1920, 9.68 inches.

Average highest temperatures: 1919 to 1920, 100.9° F.; average lowest temperatures 1919 to 1920, 34.3° F.

Character of soil of irrigable area: Ranges from heavy clay to light sandy loam.

Principal products: Alfalfa, oats, sugar beets, and wheat.

Principal markets: Billings, Mont.; St. Paul and Minneapolis, Minn.; Denver, Colo.; Kansas City, Mo.; Seattle, Wash.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: May 21, 1907; March 3, 1909; March 13, 1912; June 23, August 9, 1913; September 24, November 3, 1914; February 27, March 20, October 9, December 23, 1915; January 15, March 15, 1916; March 20, 1917; April 4, 1918; February 25 and June 30, 1920; February 14, 1921.

Location of lands opened: Tps. 2 and 3 N., Rs. 27 to 31 E., inclusive, Montana meridian.

Limit of area of farm units: 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: First unit, entered before December 23, 1915, public land, $30 per acre, additional charge of $4 per acre payable to Indians, private land, $50 per acre since December 1, 1913; additional charge of $15 per acre for supplemental construction for all water-right applicants subject to the terms of the extension act; and all other water-right applicants who have agreed to the increased charge; public land entered since December 23, 1915, $45 per acre. Second and third units, public land $60 per acre, additional charge $4 per acre, payable to Indians; private land, $60 per acre.

Annual operation and maintenance charge: For all lands of the project except 5,529 acres on which public notices have been suspended, water delivered between July 1 and August 31, inclusive, $2.50 per acre-foot; and for water delivered prior to July 1 and subsequent to August 31, $1.75 per acre-foot; a minimum charge of $4 per irrigable acre, whether water is used or not, which minimum charge is credited to the amount due for water furnished at above rates. Water-right applicants on the first unit who failed or refused to sign the contract for payment of the supplemental construction

[1] Less than 25 population.

charge are required to pay an additional charge of $1.50 per acre of irrigable land. Of the 5,529 acres under suspended public notices, 50 cents per irrigable acre is assessed on 4,424 acres.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.
Construction recommended by board of engineers, February 26, 1905.
Construction authorized by Secretary, April 18, 1905.
First irrigation by Reclamation Service, season 1908.
First unit completed in 1908.
Second unit completed in 1915.
Entire project 97.5 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Huntley project provides for the diversion of water from the south side of the Yellowstone River about 2 miles above Huntley, Mont., into a main canal which extends down the valley about 27 miles. The greater portion of the water is distributed by gravity. Fourteen miles below the head gates a 2-unit gravity pumping plant and a 2-unit power pumping plant are installed, and 100 second-feet of water are lifted 45 feet into a high-line canal. The high-line canal serves about 5,400 acres of land above the main canal in the vicinity of Ballantine, Anita, and Pompeys Pillar, Mont. The gravity pumping plant is a reinforced concrete building containing two pumping units, each with a capacity of about 30 second-feet, and each comprising a turbine water wheel directly connected with a centrifugal pump by means of a vertical shaft. Three hundred and ten net horsepower are developed by a 34-foot drop in the main canal. The power pumping plant is a wooden-framed building covered with galvanized iron, having a concrete foundation, containing two pumping units, each with a capacity of about 23 second-feet, and each comprising a 182-horsepower semi-Diesel engine and a centrifugal pump, belt drive.

The United States claims all waste, seepage, unappropriated spring and percolating waters arising within the project, and proposes to use such waters in connection therewith.

Further operations provide for the construction of drainage canals for the relief and protection of project lands from seepage conditions, the replacing of all remaining timber structures in the first unit with permanent type structures, and the reclamation of alkaline lands by farming methods.

SUMMARY OF GENERAL DATA FOR HUNTLEY PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		32,885
Public land entered to June 30, 1921	26,464	
Public land open to entry on June 30, 1921	942	
Public land withdrawn on June 30, 1921	1,535	
Private land June 30, 1921	3,944	
Acreage Service could have supplied in season of 1920		32,085
Estimated acreage Service can supply in season 1921		32,085
Estimated acreage Service can supply in season 1922		32,085
Acreage irrigated season of 1920		20,020
Acreage cropped under irrigation season of 1920		20,020
Crops:		
Value of irrigated crops season of 1920		$543,780.00
Value of irrigated crops per acre cropped		27.10
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$129,000.00	
Miscellaneous collections and transfers issued	8,995.24	
Increase of compensation	7,244.44	
Total amount authorized		145,239.68
Encumbrances—		
Disbursements and transfers received	85,172.11	
Current liabilities	8,328.84	
Contingent liabilities	2,216.00	
Increase of compensation	7,244.44	
Total encumbrances		102,961.39
Unencumbered balance on July 1, 1921		42,278.29
Fiscal year 1922—		
Amount specified in appropriation act		198,000.00
Fiscal year 1923—		
Proposed appropriation		170,000.00

Inventories:		
Value of stock on hand		$35,048.94
Value of plant and equipment in use		33,336.92
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$1,466,761.90	
Less revenues and adjustments	17,325.18	
Net cost to June 30, 1921		1,449,436.72
Per cent completed on June 30, 1921	97.5	
Estimated per cent completed on June 30, 1922	98.0	
Estimated per cent completed on June 30, 1923	99.0	
Value of construction water-right contracts and other resources to repay net cost of project		1,333,206.3
Revenues held in reserve		15,775.89
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$737,453.23	
Less charges due and miscellaneous revenues	315,767.00	
Deficit		421,686.23
Drainage:		
Total cost of drainage works to June 30, 1921		[1] $264,848.21
Miles of drains built to June 30, 1921—		
Open	16.0	
Closed	50.3	
Total		66.3
Estimated acreage damaged by seepage on June 30, 1921		1,300
Estimated acreage protected by drains to June 30, 1921		21,000
Estimated acreage to be protected by authorized system		24,000

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges	$338,110.20	$328,823.10			$328,823.10	$9,287.10
Operation and maintenance charges (public notice)	310,281.71	258,106.11	$5,504.16	$96.42	263,706.69	46,575.02
Supplemental construction to be paid as operation and maintenance	2,290.48	1,828.75			1,828.75	461.73
Rentals, irrigation water	4,670.71	4,607.81			4,607.81	62.90
Rentals, grazing and farming lands	10,470.77	8,762.88			8,762.88	1,707.89
Contractors' freight refunds	7,636.73	7,633.45			7,633.45	3.28
Miscellaneous	8,213.91	8,142.47			8,142.47	71.44
Total	681,674.51	617,904.57	5,504.16	96.42	623,505.15	58,169.36

CONSTRUCTION DURING FISCAL YEAR.

Canal system.—One timber check and several small farm turnouts were replaced with concrete structures under supplemental construction.

Lateral system.—Timber structures were replaced with structures of permanent type. One flume on the Reservoir Line Canal was reconstructed.

Drainage system.—Owing to financial and labor conditions, only a nominal amount of drainage work was done. Drain No. 32, 5,000 feet long, and drain No. 33, 2,950 feet long, were completed.

SEEPAGE AND DRAINAGE.

For the calendar year 1920 operation and maintenance and construction charges were suspended on 1,117 acres of land that were seeped or had not been fully reclaimed from effects of seepage.

[1] Does not include $246,343.17 drainage cost (betterments) included in the gross operation and maintenance cost to Dec. 30, 1920.

General seepage conditions on the First Division remained unchanged and no new areas developed; on the Second Division conditions have become bad in a number of areas. Preliminary seepage investigations of this division were made in 1920, under an agreement with the water users, and estimated quantities of tentative drains submitted to the water users.

OPERATION AND MAINTENANCE.

The irrigation season of 1920 extended from May 27 to September 25. The precipitation during the growing season was light and insufficient to produce good crop results. June, July, and August weather was very dry, the maximum temperature being 99° F. The water supply was good for the entire season, owing to heavy snowfall during the winter previous. The Yellowstone River remained at normal low-water stage for the latter part of the season.

Maintenance work was confined to usual routine work, cleaning canals and laterals, repairing structures, and replacing timber structures with concrete.

Historical review, Huntley project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to deliver water	30,826	32,271	32,271	31,360	31,265	32,085
Acres irrigated	18,203	18,635	19,122	19,262	19,310	20,020
Miles of canal operated	210	210	229	229	229	229
Water diverted (acre-feet)	52,383	67,873	64,344	47,982	92,638	79,079
Water delivered to land (acre-feet)	17,634	21,123	21,274	20,182	31,785	24,250
Per acre of land irrigated (acre-feet)	0.97	1.13	1.11	1.06	1.64	1.21

SETTLEMENT.

All desirable unentered public land has been homesteaded and settlement is restricted to land transfers, filing of water-right applications on private lands, relinquishments and assignments.

The sale value of land is practically stationary, ranging from $75 to $200 per acre. During the fiscal year 186 acres of private land were covered by water-right applications, 2 entries by relinquishment and assignment, and 6 entries canceled by General Land Office.

Settlement data, Huntley project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Total number of farms on project	646	691	691	691	691	691
Number of irrigated farms	530	550	553	561	549	603
Operated by owners or managers	383	400	368	359	315	320
Operated by tenants	147	150	185	202	234	283
Population	1,754	2,050	1,880	2,107	2,000	1,883
Number of towns	8	8	8	8	8	8
Population	475	468	610	599	599	664
Total population in towns and on farms	2,229	2,518	2,490	2,706	2,599	2,547
Number of public schools	15	8	8	8	8	8
Number of churches	6	6	6	6	6	6
Number of banks	3	3	4	4	4	4
Total capital stock	$60,000	$60,000	$85,000	$85,000	$85,000	$95,000
Amount of deposits	$239,000	$307,114	$498,000	$540,434	$560,000	$588,362
Number of depositors	1,060	1,180	1,375	1,400	1,400	1,711
Number of relinquishments	2	5	5	2	1	3

PRINCIPAL CROPS.

The spring of 1920 was exceedingly wet until May, making it impossible to do early plowing or secure good seed beds. When the rains ceased it became dry so fast that crops could not be germinated properly, causing poor stands of sugar beets and other crops. The principal crops produced were alfalfa, 7,468 acres; wheat, 5,098 acres; beets, 2,330 acres; and oats, 1,764 acres.

The weather conditions to June 30, 1921, were the most favorable to crops that have obtained for several years. Heavy and timely rains, after seeding had been accomplished, gave promise of exceptional crop yields. All crops were in excellent condition, except alfalfa, which in the western part of the project was badly damaged by hail on May 30.

Crop report, Huntley project, Montana, 1920.

Crop.	Area (acres).[1]	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	7,468	Ton	16,962	2.27	$7.90	$134,000	$17.94
Alfalfa seed	12	Bushel	4	0.33	24.00	96	8.00
Barley	324	...do	4,816	14.82	.89	4,286	13.23
Beets	2,330	Ton	14,814	6.36	12.00	177,769	76.29
Clover hay	54	...do	99	1.83	10.75	1,064	19.70
Clover seed	142	Bushel	305	2.15	7.30	2,227	15.69
Corn	392	...do	4,441	11.33	.81	3,597	9.18
Garden	180					16,667	92.08
Oats	1,764	Bushel	40,960	23.22	.67	27,443	15.55
Pasture, summer	2,074					18,136	8.74
Winter pasture[2]	15,550					28,301	1.82
Potatoes	78	Bushel	6,449	82.68	1.11	7,158	91.77
Wheat	5,098	...do	83,549	16.38	1.44	120,040	23.54
Miscellaneous	104					2,996	28.80
Less duplicated areas	15,550						
Total cropped	20,020	Total and average				543,780	27.10
Total irrigated	20,020						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	27,468	601	83
Total irrigated area farms reported:			
Under water-right applications	19,584	584	59
Under rental contracts	436	17	01.3
Total cropped area farms reported	20,020	601	61

[1] Includes 526 acres without crop value: Beets 53, oats 84, alfalfa 35, corn 64, barley 38, wheat 252.
[2] Winter pasture derived from beets, wheat, oats, and alfalfa.

PUBLIC NOTICE AND ORDER.

PUBLIC NOTICE, FEBRUARY 14, 1921.

Annual operation and maintenance charges.—In pursuance of section 4 of the national irrigation act of June 17, 1902 (32 Stat., 388) and of acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1921 and thereafter until further notice against all lands of the Huntley project, Montana, under public notice, shall be as follows: (*a*) For water delivered between

July 1 and August 31, inclusive, $2.50 per acre-foot; and (*b*) for water delivered prior to July 1 and subsequent to August 31, $1.75 per acre-foot: *Provided*, That there shall be a minimum charge of $4 per irrigable acre for all lands, whether water is used thereon or not, payment under this charge to be credited on the water user's account under the above acre-foot rates. All operation and maintenance charges are due and payable on March 1 following the irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which water-right application is made.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Huntley project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$71.10
Inventory of materials and supplies on hand			35,048.94
Plant and equipment in use			33,336.92
Current accounts receivable			58,169.36
Construction charges not due			939,473.78
Unearned value of contracts			1,716.00
Construction cost of works		$1,465,438.50	
Operation and maintenance added to construction		1,323.40	
Gross construction cost		1,466,761.90	
Less revenues and adjustments during construction period		17,325.18	
Net construction cost			1,449,436.72
Operation and maintenance cost under public notice	$776,644.69		
Less operation and maintenance added to construction	1,323.40		
Gross operation and maintenance cost		775,321.29	
Less revenues and adjustments		313,401.62	
Deficit to Dec. 31, 1920	421,686.23		
Net cost Jan. 1 to June 30, 1921	40,233.44		
			461,919.67
Investment items in transit			65.98
Total debits			3,029,238.47

CREDITS.

Current accounts payable			8,388.52
Contingent and deferred liabilities			1,787.10
Resources for repaying cost of project			1,333,205.38
Revenues held in reserve			15,775.89
Investment:			
Disbursements and transfers from other projects	$2,511,271.40		
Items in transit	65.98		
Total		$2,511,337.38	
Less collections and transfers to other projects		841,256.80	
Net investment			1,670,080.58
Total credits			3,029,238.47

Construction cost and revenue, Huntley project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys		$5,994.19
Pumping for irrigation:		
Gravity pumping plant		2,311.02
Ballantine auxiliary pumping plant	$1,855.99	70,531.59
Total pumping for irrigation	1,855.99	72,842.61

Construction cost and revenue, Huntley project—Continued.

Features.	Fiscal year, 1921.	To June 30, 1921.
Canal system	$525.57	$695,673.14
Lateral system	16,445.04	391,429.41
Drainage system	15,131.81	264,848.21
Irrigable lands, farm units	3,505.52	8,171.54
Permanent improvements	.....	17,438.39
Telephone system	.....	9,041.01
Operation and maintenance charges transferred to construction charges	[1] 200.62	1,323.40
Gross construction cost June 30, 1921	37,263.31	1,466,761.90
Less revenues earned during construction period:		
Rentals of buildings	6,849.69	7,164.69
Field cost adjustments	307.61	[1] 300.65
Contractors' freight refunds	3.28	7,636.73
Other revenues, unclassified	.....	618.79
Profit on hospital operations	537.99	2,205.62
Total revenues	7,698.57	17,325.18
Net construction cost June 30, 1921	29,564.74	1,449,436.72

[1] Contra.

Operating cost and revenue, Huntley project.

Features.	Calendar year 1920.		Betterments expended prior to 1915.	Total.	To Dec. 31, 1920.		Betterments expended prior to 1915.	Total.
	Operation.	Maintenance.			Operation.	Maintenance.		
COSTS.								
Pumping for irrigation	$3,096.48	$5,882.63	.....	$8,979.11	$11,113.68	$13,397.86	.....	$24,511.54
Canal and lateral systems:								
First Division	7,592.57	29,964.75	$78,259.87	115,817.19	64,033.17	253,555.35	$78,259.87	395,848.39
Second Division	1,359.45	2,172.65	.....	3,532.10	4,236.67	14,418.79	.....	18,655.46
Third Division	786.21	4,280.80	.....	5,067.01	3,768.58	14,779.02	.....	18,547.60
Repairs to Main Canal	.....	2,672.97	.....	2,672.97	.....	2,672.97	.....	2,672.97
Subtotal	9,738.23	39,091.17	78,259.87	127,089.27	72,038.42	285,426.13	78,259.87	435,724.42
Permanent improvements, all divisions	.....	.....	.....	.....	.....	5,792.05	.....	5,792.05
Drainage system, First Division	.....	3,980.63	246,343.17	250,323.80	78.24	25,004.08	246,343.17	271,425.49
Total cost	12,834.71	48,954.43	324,603.04	386,392.18	83,230.34	329,620.12	324,603.04	737,453.50
Less unpaid operation and maintenance charges added to construction	.....	[1] 173.15	.....	[1] 173.15	.....	1,399.40	.....	1,399.40
Total	12,834.71	49,127.58	324,603.04	386,565.33	83,230.34	328,220.72	324,603.04	736,054.10
REVENUES.								
Operation and maintenance repayments under contracts with water users:								
Payments advanced	.....	.....	.....	68.65	.....	.....	.....	68.65
Charges due	.....	.....	.....	65,884.87	.....	.....	.....	310,851.47
Interest and penalties	.....	.....	.....	543.01	.....	.....	.....	3,203.33
Water rentals	.....	.....	.....	1,269.04	.....	.....	.....	3,988.56
Rentals of buildings	.....	.....	.....	[1] 6,094.29	.....	.....	.....	.....
Other revenues, unclassified	.....	.....	.....	49.36	.....	.....	.....	380.55
Discounts	.....	.....	.....	[1] 1,150.99	.....	.....	.....	[1] 4,124.69
Total revenues	.....	.....	.....	60,569.65	.....	.....	.....	314,367.87
Difference, deficit	.....	.....	.....	[2] 325,995.68	.....	.....	.....	421,686.23

[1] Contra.

[2] Deficit for calendar year includes: Actual operation and maintenance profit, $4,701.65; prior betterment cost transferred to operation and maintenance during calendar year, $324,603.04; reduction in revenues earned in previous years by transfers to construction accounts, rentals of buildings, $6,094.29.

Cost by calendar years, Huntley project.

Year ending Dec. 31—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1904	$2,393.91	.....	$2,393.91	.....	.....	.....	$2,393.91
1905	52,273.57	.....	52,273.57	.....	.....	.....	52,273.57
1906	353,388.54	.....	353,388.54	.....	.....	.....	353,388.54
1907	403,341.52	.....	403,341.52	.....	.....	.....	403,341.52
1908	11,804.16	.....	11,804.16	$36,562.17	.....	$36,562.17	48,366.33
1909	7,502.28	.....	7,502.28	44,005.64	.....	44,005.64	51,507.92
1910	6,299.90	.....	6,299.90	36,421.19	.....	36,421.19	42,721.09
1911	8,022.58	$24.00	8,046.58	48,323.71	$24.00	48,299.71	56,346.29
1912	41,767.12	499.08	42,266.20	114,130.85	499.08	113,631.77	155,897.97
1913	40,423.28	800.32	41,223.60	107,895.49	800 32	107,095.17	148,318.77
1914	46,078.35	.....	46,078.35	120,734.61	.....	120,734.61	166,812.96
1915	135,370.33	.....	135,370.33	21,644.35	.....	21,644.35	157,014.68
1916	114,772.14	.....	114,772.14	25,792.11	.....	25,792.11	140,564.25
1917	107,428.90	.....	107,428.90	32,053.42	.....	32,053.42	139,482.32
1918	61,443.87	.....	61,443.87	34,686.95	.....	34,686.95	96,130.82
1919	24,989.80	.....	24,989.80	53,413.87	.....	53,413.87	78,403.67
1920	41,834.53	.....	41,834.53	61,789.14	.....	61,789.14	103,623.67
Jan. 1 to June 30, 1921	6,303.72	.....	6,303.72	39,191.19	.....	39,191.19	45,494.91
Total	1,465,438.50	1,323.40	1,466,761.90	776,644.69	1,323.40	775,321.29	2,242,083.19

Cost by fiscal years, Huntley project.

Year ending June 30—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1905	$30,272.90	.....	$30,272.90	.....	.....	.....	$30,272.90
1906	92,908.30	.....	92,908.30	.....	.....	.....	92,908.30
1907	486,052.11	.....	486,052.11	.....	.....	.....	486,052.11
1908	168,984.40	.....	168,984.40	$37,497.57	.....	$37,497.57	206,481.97
1909	18,393.50	.....	18,393.50	55,381.13	.....	55,381.13	73,774.63
1910	8,450.36	.....	8,450.36	34,444.69	.....	34,444.69	42,895.05
1911	3,444.37	$24.00	3,468.37	43,234.72	$24.00	43,210.72	46,679.09
1912	29,595.50	499.08	30,094.58	88,984.91	499.08	88,485.83	118,580.41
1913	29,014.44	800.32	29,814.76	82,043.58	800.32	81,243.26	111,058.02
1914	45,566.57	.....	45,566.57	115,309.05	.....	115,309.05	160,875.62
1915	89,895.27	.....	89,895.27	59,157.05	.....	59,157.05	149,052.32
1916	163,689.06	.....	163,689.06	28,802.56	.....	28,802.56	192,491.62
1917	100,808.26	.....	100,808.26	22,086.10	.....	22,086.10	122,894.36
1918	90,514.87	.....	90,514.87	38,886.79	.....	38,886.79	129,401.66
1919	44,448.98	.....	44,448.98	44,792.99	.....	44,792.99	89,241.97
1920	26,136.30	.....	26,136.30	60,897.95	.....	60,897.95	87,034.25
1921	37,263.31	.....	37,263.31	65,125.60	.....	65,125.60	102,388.91
Total	1,465,438.50	1,323.40	1,466,761.90	776,644.69	1,323.40	775,321.29	2,242,083.19

General expense, Huntley project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance	Total.
Washington office	$902.05	$1,814.11	$2,716.16	$28,793.54	$15,394.81	$44,188.35
Project office	2,065.14	4,130.28	6,195.42	118,262.59	111,193.24	229,455.83
Denver office	465.81	931.63	1,397.44	9,438.71	8,335.41	17,774.12
District counsel's office	202.44	404.90	607.34	1,364.11	4,340.28	5,704.39
Other offices and miscellaneous	24.07	48.15	72.22	16,007.51	7,202.68	23,210.19
Total	3,659.51	7,329.07	10,988.58	173,866.46	146,466.42	320,332.88
Percentage of general expense to gross cost	9.82	11.26	10.73	11.87	18.95	14.3

MONTANA, MILK RIVER PROJECT.

G. E. Stratton, project manager, Malta, Mont.
R. M. Snell, project manager, St. Mary Storage Division, Browning, Mont.

LOCATION.

Counties: Glacier, Hill, Blaine, Phillips, and Valley.

Townships: 34 to 37 N., R. 14 W.; 34 N., R. 15 W.; 37 N., Rs. 11 to 13 W.; 33 to 37 N., Rs. 10 to 13 E.; 27 to 33 N., Rs. 17 to 42 E., Montana meridian.

Railroads: Great Northern and Canadian Pacific.

Project cities and towns and estimated population June 30, 1921: Havre, 5,500; Chinook, 1,220; Zurich, 50; Harlem, 720; Savoy, 80; Coburg, 80; Dodson, 300; Wagner, 50; Malta, 1,425; Bowdoin, 200; Saco, 425; Beaverton, 50; Hinsdale, 400; Glasgow, 2,060; and Nashua, 270.

WATER SUPPLY.

Source of water supply: St. Mary Lakes, Swiftcurrent Creek, and Milk River.

Area of drainage basin: St. Mary Lakes and Swiftcurrent Creek, 298 square miles; Milk River at Havre, 5,550 square miles; Milk River at Malta, 11,850 square miles; Milk River at Hinsdale, 20,150 square miles.

Annual run-off in acre-feet of St. Mary River (including Swiftcurrent Creek): At Babb (298 square miles), 1902–1920—maximum, 830,000; minimum, 423,000; mean, 491,548. At international line (452 square miles), 1903–1917—maximum, 1,107,300; minimum, 514,100; mean, 721,000. Of Milk River: At Havre (5,550 square miles), 1898–1920—maximum, 426,000; minimum, 17,100; mean, 210,000. At Malta (11,850 square miles), 1903–1920—maximum, 712,800; minimum, 29,400; mean, 332,600. At Vandalia Dam (station formerly at Hinsdale, 6 miles upstream) (20,150 square miles), 1908–1920—maximum, 1,210,000; minimum, 146,500; mean, 560,500.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1921: 69,100 acres.

Area under rental contracts, season 1921 (to June 30): 26,500 acres.

Length of irrigation season: From April 16 to September 30, 170 days.

Average elevation of St. Mary storage: 5,500 feet above sea level.

Average elevation of irrigable area: 2,200 feet above sea level.

Rainfall on St. Mary storage: About 24 inches, average.

Rainfall on irrigable area: At Havre, 40 years, average 13.47 inches; 1920, 14.14 inches; at Malta, 15 years, average 12.93 inches; 1920, 16.23 inches.

Average of highest recorded temperatures at Malta, 12 years, 101° F.; average of lowest recorded temperatures at Malta, 12 years, −42° F.

Character of soil of irrigable area: Sandy loam, clayey loam, and some gumbo.

Principal products: Alfalfa, native blue joint hay, and other forage crops, grain, and vegetables.

Principal markets: Minneapolis and St. Paul, Minn.; Great Falls, Mont., and local.

LANDS OPENED FOR IRRIGATION.

Order, April 3, 1920. No additional lands opened for irrigation during the past year.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun by the Reclamation Service in 1902.

Construction conditionally authorized by Secretary March 14, 1903.

Construction of St. Mary storage unit authorized by Secretary March 25, 1905.

Construction begun July 27, 1906.

Dodson diversion dam completed in January, 1910.

Treaty with Great Britain relating to distribution between Canada and the United States of the waters of St. Mary and Milk Rivers signed January 11, 1909, and proclaimed May 13, 1910.

Water delivered for irrigation in 1911.

Recommendations covering construction of the project approved by Secretary June 13, 1912.

Dodson North Canal completed in 1914.

Sherburne Lake Reservoir begun June 29, 1914.

Vandalia diversion, Vandalia and Dodson South Canals completed in 1915.

Nelson Reservoir, first development completed 1915.

Nelson Reservoir Canal begun 1915.

First water diverted from St. Mary River to North Fork of Milk River in 1916.

Bowdoin Canal begun 1915; first unit completed 1917.

First unit of Nelson Reservoir Canal lateral system completed and water from Nelson Reservoir delivered for irrigation, 1918.

Sherburne Lakes Reservoir, first development completed 1921.

Milk River Division 50 per cent completed June 30, 1921.

St. Mary Storage Division 86 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Milk River project provides for the storage of water in the Sherburne Lakes and its diversion through a canal 28.9 miles long, heading three-fourths of a mile below the Lower St. Mary Lake and discharging into the North Fork of Milk River, thence flowing through Canada for 216 miles and returning to the United States; the storage of water in Nelson Reservoir south of Milk River and 14 miles northeast of Malta; the discharge of stored water into Milk River as required; the diversion of water from Milk River by three or more dams near Chinook and Harlem into canals on each side of the river, for the irrigation of lands near Chinook and Harlem, comprising the Chinook Division; the diversion of water from Milk River by a dam near Dodson into two canals, the north side canal irrigating lands near Dodson, Wagner, and Malta, and the south side canal conveying water to Nelson Reservoir and irrigating lands near Wagner, Malta, Bowdoin, and Ashfield; the irrigation of lands on the south side of Milk River and Beaver Creek in the vicinity of Saco and Hinsdale from the stored waters of Nelson Reservoir, comprising the Malta Division; and in the Glasgow Division the diversion of water at Vandalia Dam into a canal on the south side of Milk River for the irrigation of lands near Tampico, Glasgow, and Nashua. In case the normal flow of Milk River at Vandalia Dam is not sufficient for the irrigation of lands in the Glasgow Division, the stored waters in Nelson Reservoir will be returned to Milk River and diverted again at Vandalia Dam. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: 28.9 miles of the St. Mary Canal, except the second pipe line across St. Mary River and Halls Coulee; Sherburne Lakes Reservoir to its first development; Vandalia diversion dam, including the automatic movable crest gates and Dodson diversion dam, including the movable crest; headworks for the Dodson North, Dodson South, and Vandalia Canals; 8 miles of the Dodson South Canal, with a capacity of 900 second-feet, including Point of Rocks equalizing reservoir, 35 miles, with a capacity of 500 second-feet, and the lateral and waste-water systems to cover 14,500 acres; 23 miles of Dodson North Canal, with a capacity of 200 second-feet at its head, including the lateral and waste-water systems for 12,000 acres; 45 miles of Vandalia Canal, with a capacity of 300 second-feet at its head, including the lateral and waste-water systems for 18,500 acres; 18 miles of Bowdoin Canal, with a capacity of 175 second-feet at its head, including lateral and waste-water systems for 6,500 acres; Nelson Reservoir Main Canal with a capacity of 250 second-feet at its head; the first development of Nelson Reservoir to store 25,000 acre-feet; and the first unit of the Nelson Reservoir Canal lateral system to cover 17,700 acres.

Work under construction consists of the extension of lateral system, including structures, under the Nelson Reservoir Canal system, Vandalia Canal system, and Bowdoin Canal system; the enlargement of Nelson Reservoir to 70,000 acre-feet capacity; and enlargement of Nelson Reservoir Canal, station 1020 to station 1160.

The principal features remaining to be completed are: Chinook Division, comprising one or more diversion dams and the North and South Canals, all of which will probably now be financed by the landowners; Chain Lakes Reservoir; Beaver Creek Reservoir and Canals; the second units of Bowdoin and Nelson Reservoir Canal systems; the extension of Vandalia Canal and lateral system; the final development of Sherburne Lakes Reservoir; and the second pipe line across St. Mary River and Halls Coulee crossing.

SUMMARY OF GENERAL DATA FOR MILK RIVER PROJECT TO END OF FISCAL YEAR 1921.

(Exclusive of St. Mary Storage Division.)

Areas:		
Irrigable acreage when project is complete		189,86[illegible]
Public land entered to June 30, 1921	33,582	
Public land withdrawn on June 30, 1921	21,276	
State land unsold, June 30, 1921	6,981	
Indian land June 30, 1921	28,000	
Private land June, 30, 1921	100,029	
Acreage Service could have supplied in season of 1920		[1] 68,600
Estimated acreage Service can supply in season 1921		[1] 69,100
Estimated acreage Service can supply in season 1922		[1] 74,000
Acreage irrigated season of 1920		[1] 24,330
Acreage cropped under irrigation season of 1920		[1] 22,330
Acreage dry-farmed season of 1920		[1] 12,764
Crops:		
Value of irrigated crops season of 1920		[1] $332,200.00
Value of irrigated crops per acre cropped		[1] 14.90
Value of dry-farmed crops season of 1920		[1] 102,543.00
Value of dry-farmed crops per acre cropped		[1] 8.05

(Including St. Mary Storage Division.)

Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$552,000.00	
Miscellaneous collections and transfers issued	43,132.67	
Increase of compensation	21,940.02	
Total amount authorized		617,072.69
Encumbrances—		
Disbursements and transfers received	$327,372.51	
Current liabilities	29,041.40	
Contingent liabilities	22,538.50	
Increase of compensation	21,949.44	
Total encumbrances		400,901.85
Unencumbered balance on July 1, 1921		216,170.84
Fiscal year 1922—		
Amount specified in appropriation act		1,017,000.00
Encumbrances—		
Current liabilities	$97,094.40	
Contingent liabilities	10,509.44	
Total encumbrances		107,603.84
Unencumbered balance on July 1, 1921		909,396.16
Fiscal year 1923—		
Proposed appropriation		890,000.00
Inventories:		
Value of stock on hand		38,478.13
Value of plant and equipment in use		54,252.96
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$3,754,182.96	
Less revenues and adjustments	160,514.12	
Net cost to June 30, 1921		3,593,668.84
Per cent completed on June 30, 1921	50	
Estimated per cent completed on June 30, 1922	54	
Estimated per cent completed on June 30, 1923	63	
Value of construction water-right contracts and other resources to repay net cost of project		10,123.80
Revenues held in reserve		16,164.26
Drainage: Estimated acreage damaged by seepage on June 30, 1921		1,495

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenue as of June 30, 1921.

(Exclusive of St. Mary Storage Division.)

Accounts.	Due.	Collected (cash).	Uncollected.
Rentals of irrigation water	$136,537.97	$105,234.23	$31,303.74
Rentals, grazing and farming lands	19,022.43	15,893.15	3,129.28
Contractors' freight refunds	18,810.86	18,676.40	134.46
Miscellaneous	4,846.88	4,843.13	3.75
Total	179,218.14	144,646.91	34,571.23

[1] Exclusive of Chinook Division.

ST. MARY STORAGE DIVISION.

Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$250,000.00	
Miscellaneous collections	7,806.70	
Transfers to other projects	2,568.25	
Increase of compensation	7,067.72	
Total amount authorized		$267,442.67
Encumbrances:		
Disbursements	91,996.15	
Transfers from other projects	5,748.86	
Current liabilities	4,523.35	
Increase of compensation	7,058.30	
Total encumbrances		109,326.64
Unencumbered balance on July 1, 1921		22,673.63
Amount allotted		132,000.00
Fiscal year 1922—		
Estimated amount available for allotment and expenditure		38,000.00
Fiscal year 1923—		
Proposed appropriation		36,000.00 282,000.00
Inventories:		
Value of stock on hand		35,187.73
Value of plant and equipment in use		50,453.69
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$2,696,334.08	
Less revenues and adjustments	32,436.60	
Net cost to June 30, 1921		2,663,897.48
Per cent completed on June 30, 1921	86	
Estimated per cent completed on June 30, 1922	87	

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected (cash).	Uncollected.
Contractors' freight refunds	$6,839.03	$6,672.68	$166.35
Miscellaneous	22,496.85	20,298.16	2,198.9
Total	29,335.88	6,970.84	2,365.04

CONSTRUCTION DURING FISCAL YEAR.

Chinook Division.—The Paradise Valley Irrigation District continued construction of the main canal, laterals, and structures, and the Fort Belknap Canal and Irrigation Co. commenced enlargement of its main canal, using a steam drag line for this purpose. All the above work was financed by the interested companies, partly by direct assessment and partly by bonds. In addition to the Paradise Valley Irrigation District previously created, the Fort Belknap, Alfalfa Valley, and Zurich districts were created during the fiscal year.

Malta Division.—11.3 miles of laterals and waste-water ditches were built by contract, involving about 90,000 yards of excavation. A concrete siphon, passing one of the main laterals under Beaver Creek about 5 miles west of Hinsdale, numerous small structures, comprising checks, turnouts, and measuring devices on the lateral system, and about 60 miles of operating roads on top of main canal banks were built by Government forces. Earthwork on enlargement of about one and one-half miles of the Nelson Reservoir Canal was partially completed by Government forces. Enlargement by contract of Nelson Reservoir, from 25,000 to 70,000 acre-feet capacity, was commenced in June. An office building and a three-

room lodging house were erected by contract at the Saco operation and maintenance headquarters.

Glasgow Division.—Contracts were let for earthwork on the extension of about 4.5 miles of laterals and waste-water ditches, involving about 65,000 yards of excavation; the contracts were about 50 per cent completed at the end of the fiscal year. Bridges, culverts, flumes, and wasteways were in progress of construction by contract, and numerous small structures, comprising turnouts, checks, drops, and measuring devices, were placed by Government forces. A three-room cottage was built by contract at Vandalia Diversion.

St. Mary Storage Division.—Sherburne Lakes Dam: The first development of Sherburne Lakes Dam was completed, including construction of timber spillway flume, and the completion of dam embankment, concrete parapet wall, paving on the face of the dam, and protection work at the lower end of the outlet conduit.

St. Mary Canal: Several sections of porous bank between the diversion works and Powell Creek were rebuilt to prevent excessive leakage, and work was started on removing slides from the canal section with a drag-line excavator.

SEEPAGE AND DRAINAGE.

Seepage is showing on some of the lands adjacent to Nelson Reservoir about 8 miles west of Saco; on lands under Dodson South Canal between mile 13 and mile 19, between Wagner and Alkali Creek, and about mile 33, near Strater; under Dodson North Canal, in several basements in the town of Dodson; and under the Vandalia Canal at about mile 30, and to limited extent at several other points. In all about 1,495 acres are affected.

No drains have been constructed. Test wells have been put down in seeped areas and by means of frequent water surface readings in these and domestic wells, data are being gathered which will serve as a basis for future drainage designs. Surface waste-water ditches are already constructed to tap practically each farm under completed works.

BOARD MEETINGS.

Date.	Subject.	Personnel.
Oct. 21, 22, 1920....	Construction of proposed Connolly Dam.....	James Munn, R. M. Snell, Geo. E. Stratton.
Oct. 23, 1920.....	Enlargement of Nelson Reservoir from 25,000 to 70,000 acre-feet.	Do.

OPERATION AND MAINTENANCE.

As compared with the season of 1919 the rainfall in 1920 and 1921 was large. Heavy rains occurred in June, 1920, which provided flood irrigation from private systems over part of the project and made the demand for water during the last half of 1920 almost negligible. During the season of 1921 the rainfall was frequent and at times heavy. The usual cycle was a few days of hot weather in which the irrigators would request water and deliveries would be built up to a sizable amount when a rain would occur and the irrigators would request that practically all deliveries be shut off.

Deliveries, therefore, were intermittent and the aggregate small. The water supply was ample, but in order to insure against possible shortage it was necessary to augment the natural flow of the Milk River by supplemental supply from the St. Mary River diverted through the St. Mary Canal.

From July 1, 1920, to the end of the operating season, the delivery of water on a water-rental basis was in progress under the Dodson North, Dodson South, Bowdoin, Nelson Reservoir, and Vandalia Canals. Bowdoin, Nelson Reservoir, and Vandalia Canals were closed for the season on August 30, Dodson South on September 20, and Dodson North on September 30. As soon as Vandalia Canal was closed the sluiceways in the dam were opened and the crest gates were cleaned and painted. About 10,460 acre-feet of water were delivered to 18,500 acres, comprising 230 farms, or 0.58 acre-foot per acre. It will be noted that the acreage irrigated does not agree with the 24,330 acres shown in the historical review table. The difference was irrigated by means of flood waters on various parts of the project.

During 1921 all the above-mentioned canals were operated for the delivery of water on a water-rental basis. The Dodson South Canal was in operation between March 7 and 11, but owing to storms and cold weather was closed down till March 24; during the remainder of the fiscal year it was operated as requirements demanded. Other canals were opened at such times as water was needed.

The maximum diversion at Dodson Dam was 420 second-feet on April 15, and at Vandalia Dam 142 second-feet on June 14. Nelson Reservoir was filled to capacity in September, 1920, and again in April, 1921.

In addition to the operation mentioned above, St. Mary supplemental water was delivered to the private canal companies on the Chinook Division at the headworks of canals as shown in the following table, for the season of 1920:

Canal.	Total diversion.	St. Mary water used.
	Acre-feet.	*Acre-feet.*
Fort Belknap Canal & Irrigation Co.	5,332	2,410
New Harlem Irrigation Co.	4,558	1,120
Paradise Valley Ditch & Irrigation Co.	4,113	1,831
Total	14,003	5,361

This water was applied to about 23,000 acres.

Water-rental rates

[Per acre-foot.]

	Chinook Division.		Malta and Glasgow Divisions.	
	1920	1921	1920	1921
Delivered at headworks	$1.00	[1]		
Lands subject to reclamation act or otherwise obligated to repay construction charges			$3.00	$2.00
For nonobligated lands			5.00	5.00

[1] During the season of 1921 Chinook Division will pay actual cost of operation and maintenance as determined at the close of the calendar year.

The main item of maintenance has been the cleaning of canals of silt and vegetable matter. On Dodson North Canal a type 1 A Monighan drag line was used from August to November, removing 16,510 cubic yards, at a cost of approximately 40 cents per cubic yard. From the first part of April to the end of the fiscal year this work was continued with a class 206 Pawling & Harnischfeger gasoline-propelled drag line, 22,540 yards being excavated at a cost of 11.6 cents per cubic yard. On waste-water ditch NW 1–3, leading from the seeped area near Nelson Reservoir, cleaning and enlarging was done with a class 206 Pawling & Harnischfeger drag line, 5,190 yards being removed at a cost of 13.4 cents per cubic yard.

Other items included extensive repairs to canal bed and banks below structures on the various canals and extensive repairs to two wasteways. More or less extensive repairs were also required on several flumes, checks, and drops, and the usual routine included painting steelwork, removing weeds, grubbing brush, poisoning gophers, etc.

St. Mary Storage Division.—Twenty-eight thousand five hundred acre-feet of water were stored in Sherburne Lakes Reservoir between June 24 and July 15. As the natural stream flow kept up well through the summer, this water was not all needed for diversion to Milk River, and a large part of it was wasted between July 19 and August 16.

The St. Mary Canal was operated from May 25 to August 31; 94,570 acre-feet of water were diverted from St. Mary River and 72,030 acre-feet delivered to the North Fork of Milk River.

There were no serious operation difficulties, and the maintenance work was confined to minor repairs to structures and canal banks.

Historical review, Milk River project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	40,000	40,358	45,000	58,750	58,900	68,600
Acreage irrigated	4,192	5,518	11,058	24,842	25,485	24,330
Miles of canal operated	86	184	204	254	317	361
Water diverted	13,041	[1] 61,534	[1] 68,503	[1] 74,924	[1] 86,680	[1] 88,570
Water delivered to land (acre-feet)	2,884	3,700	11,195	16,900	21,500	10,460
Per acre of land irrigated (acre-feet)	0.80	0.67	1.01	0.68	0.84	0.58

[1] Includes water for Nelson Reservoir.

SETTLEMENT.

The project has not been formally opened and consequently no lands are now subject to entry.

On April 30, 1920, 21 farm units were opened to entry, on a rental basis only, to officers, soldiers, sailors, and marines who served in the war with Germany. All units were immediately filed on.

There have been a few transfers of land within the project, but probably less than during the last few years.

Three Government town sites have been opened on the project—one at Vandalia on July 1, 1916, one at Zurich on June 23, 1917, and one at Bowdoin on December 1 and 3, 1917, and August 23, 1919.

Settlement data of irrigated district, Milk River project, by calendar years.

(Exclusive of St. Mary Storage.)

Item.	1916	1917	1918	1919	1920
Total number of farms on project	155	192	217	249	466
Population	430	580	688	757	763
Number of irrigated farms	64	112	184	247	230
Operated by owners or managers	37	77	140	186	208
Operated by tenants	27	35	44	61	22
Population	193	404	600	750	763
Number of towns	5	6	9	11	15
Population	4,500	5,000	6,000	6,500	7,796
Total population on farms and towns	4,930	5,580	6,688	7,257	8,559
Number of public schools	14	14	18	20	[1] 38
Number of churches	14	15	18	22	[1] 25
Number of banks	7	10	15	23	[1] 25
Total capital stock	$252,000	$375,000	$525,000	$780,000	[1] 765,000
Amount of deposits	$1,959,000	$3,238,000	$3,219,000	$5,279,730	[1] $4,500,000
Number of depositors	6,615	9,156	11,640	17,600	[1] 14,000

[1] Includes Chinook Division.

Exclusive of Chinook Division unless otherwise shown.

PRINCIPAL CROPS.

The principal crops grown are alfalfa, small grains, and native blue-joint hay. Alfalfa comprises (exclusive of the Chinook Division) about 18 per cent of the total cropped area, small grains 20 per cent, and native blue-joint hay 60 per cent. The remaining 2 per cent is confined principally to corn, potatoes, and garden. The large percentage of acreage in native hay is due to the fact that no breaking or leveling is required to produce a crop.

The season of 1920 was fair for the growing of most crops. Dry weather during May and a few days of hot winds the latter part of July damaged the small grain crops considerably. The hay crop showed less in amount but more per acre than for the 1919 season.

The season of 1921 promises to be favorable to all crops. The winter was one of the mildest on record and alfalfa came through in excellent shape. Owing to frequent rains and comparatively cool weather, the crop outlook was better than for several years past. Practically the entire first cutting of alfalfa was raised without the aid of irrigation.

Crop report, irrigated farms, Milk River project, Montana (exclusive of Chinook Division), 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	4,031	Ton	7,516	1.9	$12.00	$90,190	$22.37
Alfalfa seed	35	Bushel	65	2.9	24.00	1,572	69.40
Barley	89	do	1,302	14.6	.45	586	6.60
Cane	19	Ton	75	3.2	12.00	900	38.52
Corn, flint	63	Bushel	1,552	24.6	1.00	1,550	24.60
Corn fodder	104	Ton	390	3.7	10.00	3,900	37.50
Flax	575	Bushel	2,655	4.6	2.10	5,580	9.70
Garden	15					3,730	248.67
Hay [1]	13,315	Ton	8,807	.7	16.00	140,910	10.56
Oats	1,058	Bushel	23,758	22.4	.75	17,820	16.80
Pasture	35					205	5.85
Potatoes	88	Bushel	12,339	140	1.50	18,510	210.30
Rye	85	do	820	9.6	1.10	903	10.60

[1] Native blue-joint hay, 95 per cent; grain hay, 5 per cent.

Crop report, irrigated farms, Milk River project, Montana (exclusive of Chinook Division), 1920—Continued.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Sedan grass	192	Ton	60	0.3	$8.00	480	$2.50
Wheat	2,799	Bushel	26,227			45,364	
Less duplicated areas	173						
Total cropped	[2] 22,330	Total and average				332,200	14.90

	Areas.	Acres.	Farms.	Per cent of project.
Young alfalfa 2,000	Irrigable area farms reported	37,420	230	36
	Irrigated area farms reported	24,330	[3] 230	18
Total irrigated 24,330	Cropped area farms reported	22,330	230	22

[2] This report includes 18,000 acres irrigated from Government canals and 6,330 irrigated from creek floods.
[3] 152 farms more than 50 per cent irrigated; 78 farms less than 50 per cent irrigated.

Crop report, dry-farmed units, Milk River project, Montana (exclusive of Chinook Division), 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	862	Ton	945	1.1	$12.00	$11,340	$13.20
Alfalfa seed	20	Bushel	90	4.5	24.00	2,160	108.00
Barley	49	do	450	9.2	.45	202	4.14
Beans	1	do	10	10	7.00	70	70.00
Cane	8	Ton	35	4.4	12.00	420	52.50
Corn, flint	312	Bushel	2,960	9.5	1.00	2,960	9.50
Corn fodder	129	Ton	244	1.9	10.00	2,440	18.90
Flax	743	Bushel	1,060	1.4	2.10	2,226	3.00
Garden	4					700	175.00
Hay [1]	1,521	Ton	1,000	.7	16.00	16,000	10.50
Millet seed	105	Bushel	50	.5	6.00	300	2.86
Oats	613	do	8,002	13	.75	6,002	9.78
Pasture	5,280					23,785	4.50
Potatoes	29	Bushel	2,615	90	1.50	3,923	135.25
Rye	80	do	112	1.4	1.10	123	1.54
Sedan grass	60	Ton	35	.6	8.00	280	4.67
Wheat	2,959	Bushel	16,919	5.7	1.75	29,609	10.00
Less duplicated areas	15						
Total cropped (dry farmed)	12,760	Total and average				102,540	8.05

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	45,271	[2] 287	44
Total cropped area farms reported (dry farmed)	12,760		12

[1] Native blue-joint hay, 94 per cent; grain hay, 6 per cent.
[2] 57 farms dry farmed, balance of area is included in farms partially irrigated.

FINANCIAL STATEMENT.

Condensed financial statement, Milk River project, June 30, 1921.

(Exclusive of St. Mary Storage Division.)

DEBITS.		
Collections on hand and in special deposit		$385.94
Inventory of materials and supplies on hand		38,478.13
Plant and equipment in use		54,252.96
Current accounts receivable		34,571.23
Construction charges not due		[1] 1,114.00
Unearned value of contracts		26,804.60
Construction cost of works	$3,462,308.94	
Operation and maintenance cost during construction	291,874.02	
Gross construction cost	3,754,182.96	
Less revenues and adjustments during construction period	160,514.12	
Net construction cost		3,593,668.84
Investment items in transit		2,430.49
Total debits		3,749,478.19
CREDITS.		
Current accounts payable		25,260.96
Contingent and deferred liabilities		27,190.54
Resources for repaying cost of project		9,009.80
Revenues held in reserve		16,164.26
Investments:		
Disbursements and transfers from other projects	$3,879,519.91	
Items in transit	2,430.49	
Total	$3,881,950.40	
Less collections and transfers to other projects	210,097.77	
Net investment		3,671,852.63
Total credits		3,749,478.19

Construction cost and revenue, Milk River project.

(Exclusive of St. Mary Storage Division.)

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and surveys:		
Chinook Division	$6,020.32	$65,240.90
Malta Division	5,882.49	63,777.96
Glasgow Division	1,778.75	19,255.41
Total examination and surveys	13,682.56	148,274.27
Storage system:		
Beaver Reservoir		2,361.63
Chain Lakes	3,823.84	13,592.52
Nelson Reservoir	6,916.04	75,781.50
Total storage system	10,739.88	91,735.65
Canal system:		
Bowdoin	1,404.16	65,076.93
Chinook diversion (from Milk River)		699.76
Chinook Canals		4,788.86
Dodson diversion (from Milk River)	1,186.96	356,201.58
Dodson North Canal	1,310.70	212,135.01
Dodson South Canal	4,245.43	696,894.16
Nelson Reservoir	4,978.18	130,190.55
Vandalia diversion (from Milk River)	405.64	448,389.94
Vandalia Canal	2,461.05	411,[illegible].64
Total canal system	15,992.12	2,325,883.43
Lateral system:		
Bowdoin laterals	322.95	63,185.48
Dodson North laterals	1,289.71	118,860.12
Dodson South laterals	1,945.[illegible]	142,147.78
Nelson Reservoir laterals	58,794.14	[illegible],950.64
Vandalia laterals	16,360.93	134,[illegible].67
Total lateral system	78,713.12	709,043.69

[1] Contra.

Construction cost and revenue, Milk River project—Continued.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Drainage system:		
Bowdoin	$78.69	$78.69
Dodson North system	1,250.22	1,256.72
Dodson South system	464.72	1,363.99
Nelson Reservoir system	1,258.12	2,500.33
Vandalia system	410.42	1,266.09
Total drainage system	3,462.17	6,465.82
Flood protection:		
Dodson South system	.....	37,045.09
Vandalia system	.....	1,432.85
Total flood protection	.....	38,477.94
Irrigated lands (farm units):		
Bowdoin	.....	941.45
Dodson North	.....	3,756.73
Dodson South	.....	8,690.03
Nelson Reservoir	642.50	2,392.25
Vandalia	2,988.35	5,037.49
Total irrigated lands	3,630.85	20,817.95
Permanent improvements:		
Dodson Dam	11.18	172.67
Wagner operation and maintenance camp	.....	4,308.37
Malta project headquarters, buildings, and grounds	3,055.45	19,029.59
Saco operation and maintenance camp	11,942.73	15,175.13
Paisley operation and maintenance camp	478.02	2,789.63
Vandalia Dam gate tender's cottage and grounds	4,553.02	4,553.02
Total permanent improvements	20,040.40	46,028.41
Telephone system:		
Malta	.....	5,042.98
Saco	.....	6,069.48
Glasgow	.....	4,469.32
Total telephone system	.....	15,581.78
Operation and maintenance during construction (water rental)	78,164.96	291,874.02
Gross construction cost	224,426.06	3,754,182.96
Less revenues earned during construction period:		
Rentals of buildings	232.00	3,032.70
Doubtful accounts	[1] 2.83	391.13
Rental of irrigation water	40,122.44	136,537.97
Contractors' freight refunds	.....	18,810.86
Other revenues unclassified	286.01	1,814.18
Profits on farming operations	[1] 105.36	1,671.02
Loss on hospital operations	[1] 744.08	[1] 1,743.74
	39,788.18	160,514.12
Net cost of construction of project (exclusive of St. Mary Storage Division)	184,637.88	3,593,668.84

[1] Contra.

Cost by calendar years.

(Exclusive of St. Mary Storage Division.)

	Construction.		
	Original.	Operation and maintenance during.	Total.
Year ending Dec. 31—			
1907	$86,882.22	.....	$86,882.22
1908	105,749.06	.....	105,749.06
1909	222,954.92	.....	222,954.92
1910	153,767.51	.....	153,767.51
1911	66,913.43	$6,379.82	73,293.25
1912	162,820.25	16,957.99	179,778.24
1913	761,123.58	13,449.85	774,573.43
1914	671,222.04	4,369.62	675,591.66
1915	332,483.85	5,789.97	338,273.82
1916	245,157.83	9,278.53	254,436.36
1917	217,036.13	15,337.13	232,373.26
1918	173,838.45	28,533.61	202,372.06
1919	90,913.20	88,863.95	179,777.15
1920	95,315.86	72,450.76	167,766.62
Jan. 1 to June 30, 1921	76,130.61	30,462.79	106,593.40
Total	3,462,308.94	291,874.02	3,754,182.96

Cost by fiscal years.

(Exclusive of St. Mary Storage Division.)

	Construction.		
	Original.	Operation and maintenance during.	Total.
Year ending June 30—			
1908	$92,919.05	.....	$92,919.05
1909	193,342.45	.....	193,342.45
1910	216,605.81	.....	216,605.81
1911	91,413.95	$2,723.61	94,137.56
1912	62,418.44	13,202.49	75,620.93
1913	444,475.39	19,720.21	464,195.60
1914	713,312.38	3,147.58	716,459.96
1915	616,628.95	4,541.08	621,170.03
1916	241,813.93	7,680.24	249,494.17
1917	239,433.75	10,282.74	249,716.49
1918	208,285.84	25,563.73	233,849.57
1919	123,977.71	33,779.80	157,757.51
1920	71,420.19	93,067.58	164,487.77
1921	146,261.10	78,164.96	224,426.06
Total	3,462,308.94	291,874.02	3,754,182.96

Statement of general expense for fiscal year 1921 and to June 30, 1921.

(Exclusive of St. Mary Storage Division.)

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington	$3,732.22	$1,799.79	$5,532.01	$73,168.57	$8,266.59	$81,435.16
Project	11,875.54	6,481.42	18,356.96	214,052.42	24,058.86	238,111.28
Denver	1,490.28	765.73	2,256.01	14,866.83	1,899.93	16,766.76
District counsel	771.34	422.16	1,193.50	39,751.55	3,927.09	43,678.64
Other offices and miscellaneous	.....	.....	.....	4,557.61	423.17	4,980.78
Total	17,869.38	9,469.10	27,338.48	346,396.98	38,575.64	384,972.62
Percentage of general expense to gross cost	12.2	12.1	12.2	10	13.2	10.3

Condensed financial statement, St. Mary Storage Division, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$273.40
Inventory of materials and supplies on hand			35,187.73
Plant and equipment in use			50,453.69
Current accounts receivable			2,365.04
Construction cost of works		$2,620,618.26	
Operation and maintenance during construction		70,122.31	
Unadjusted clearing accounts		5,593.51	
Gross construction cost		2,696,334.08	
Less revenues and adjustments during construction period		32,436.60	
Net construction cost			2,663,897.48
Investment items in transit			[1] 666.97
Total debits			2,751,510.37

CREDITS.

Current accounts payable			$4,924.44
Contingent and deferred liabilities			268.00
Investment:			
Disbursements and transfers from other projects	$2,904,391.99		
Items in transit	490.95		
Total		$2,904,882.94	
Less collections and transfers to other projects	157,407.09		
Items in transit	1,157.92		
Total		158,565.01	
Net investment			2,746,317.93
Total credits			2,751,510.37

Construction cost and revenue, St. Mary Storage Division.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys	$2,342.95	$56,302.52
Storage system:		
St. Mary Lakes Reservoir, surveys, testing, etc		38,797.87
Sherburne Lakes Reservoir, surveys, testing, etc		13,210.92
Sherburne Lakes Dam	23,259.12	357,022.29
Sherburne Lakes spillway	7,056.48	267,290.02
Sherburne Lakes outlet	2,884.05	162,297.76
Sherburne Lakes North Hillside slide	3,098.33	15,121.22
Sherburne Lakes, Altyn Trail		327.59
Sherburne Lakes spillway timber flume	29,122.49	29,337.73
Total storage system	65,420.47	883,405.40
Canal system:		
Preliminary and general work		133,729.25
St. Mary Canal	8,117.62	760,128.12
Kennedy Creek crossing		31,572.65
Diversion dam and headworks		51,933.04
Diversion dam, Swiftcurrent Creek		84,849.65
Bridges, highways across main canal		9,915.59
Control check gate, station 615+20		13,431.01
Control check gate, station 91		8,421.56
Drops		85,880.66
Kennedy Creek control check and sluice gates		14,123.24
Wasteway sluice gate, station 884		11,579.28
Culvert, Powell Creek crossing		8,059.30
Culvert east of Cow Creek		17,119.77
Culvert, Cow Creek		5,472.63
Spider Lake Coulee flume	24.05	69,206.49
Syphon, St. Mary River crossing		118,032.95
Syphon, Halls Coulee crossing		46,672.89
Road along St. Mary Canal		3,521.21
Kennedy Creek bridge		2,183.55
Removal of slides	2,734.87	2,734.87
Total canal system	10,876.54	1,478,567.71
Flood protection:		
Kennedy Creek dikes		18,560.11
Earth dikes, stations 372 and 380		1,225.79
Total flood protection		19,785.90

[1] Contra.

Construction cost and revenue, St. Mary Storage Division—Continued.

Features.	Fiscal year 1921.	To June 30, 1921.
Permanent improvements:		
Road, Browning to St. Mary, Camp 9		$45,893.87
Road, Babb to Cardston, Canada		5,585.12
Road, Babb to Canadian boundary		1,140.92
Road, Babb to Glacier Park boundary		46,268.55
Road, St. Mary Chalet to Babb, Mont		1,676.45
Office building, Camp 9		1,373.65
Water system, Camp 9		5,349.37
Cottages (4), Camp 9		3,974.10
Graveling Swiftcurrent Canyon road		11,723.81
Steel bridge, St. Mary River crossing		34,499.42
Steel bridge, Camp 2		5,723.19
Headquarters office building (vault)		1,080.55
Headquarters cottages (3)		1,997.63
Headquarters office, other than vault		116.74
Warehouse site, Browning storehouse	$135.00	135.00
Total permanent improvements	135.00	166,538.37
Telephone system:		
Completed work		11,889.90
Line along St. Mary Canal		4,128.46
Total telephone system		16,018.36
Operation and maintenance during construction	9,604.63	70,122.31
Total cost, construction features	88,379.59	2,690,740.57
Undistributed clearing accounts	1,606.07	5,593.51
Gross construction cost to June 30, 1921	89,985.66	2,696,334.08
Less revenues earned during construction period:		
Rental of buildings	556.35	19,404.91
Contractors' freight refunds	43.01	6,839.03
Other revenues, unclassified	155.87	880.13
Profit on hospital operations	47.91	1,768.01
Farming operations	1,218.90	3,544.52
Total revenues	2,022.04	32,436.60
Net cost of construction of project to June 30, 1921	87,963.62	2,663,897.48

Cost by calendar years, St. Mary Storage Division.

	Construction.		
	Original.	Operation and maintenance during.	Total.
Year ending Dec 31—			
1908	$197,453.33		$197,453.33
1909	20,578.27		20,578.27
1910	28,833.89		28,833.89
1911	20,652.46		20,652.46
1912	138,141.53		138,141.53
1913	210,408.71		210,408.71
1914	544,384.54		544,384.54
1915	738,564.09		738,564.09
1916	205,227.42	$3,371.75	209,599.17
1917	218,759.02	12,914.11	231,673.13
1918	117,111.65	17,152.30	134,263.95
1919	53,881.12	18,617.62	72,498.74
1920	107,454.18	13,394.44	120,848.62
January to June, 1921	23,761.56	4,672.09	28,433.65
Total	2,626,211.77	70,122.31	2,696,334.08

Cost statement by fiscal years, St. Mary Storage Division.

	Construction.		
	Original.	Operation and maintenance during.	Total.
Year ending June 30—			
1908	$172,596.63		$172,596.63
1909	32,143.75		32,143.75
1910	26,369.09		26,369.09
1911	25,178.79		25,178.79
1912	30,424.90		30,424.90
1913	176,585.45		176,585.45
1914	296,911.39		296,911.39
1915	808,273.43		808,273.43
1916	422,304.64	$487.54	422,792.18
1917	177,966.81	6,928.95	184,895.76
1918	193,857.45	12,833.61	206,691.06
1919	99,652.81	22,724.11	122,376.92
1920	83,565.60	17,543.47	101,109.07
1921	80,381.03	9,604.63	89,985.66
Total	2,626,211.77	70,122.31	2,696,334.08

Statement of general expense for the fiscal year, 1921, and to June 30, 1921, St. Mary Storage Division.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$2,353.84	$281.15	$2,634.99	$81,529.86	$2,176.36	$83,706.22
Project office	6,503.49	776.81	7,280.30	195,750.92	5,225.38	200,976.30
Denver office	1,029.51	122.97	1,152.48	23,914.62	638.38	24,553.00
District counsel's office, other field offices, and miscellaneous	917.67	109.61	1,027.28	4,975.62	132.82	5,108.44
Total	10,804.51	1,290.54	12,095.05	306,171.02	8,172.94	314,343.96
Percentage of general expense to gross construction	13.4	13.4	13.4	11.7	11.7	11.7

MONTANA, SUN RIVER PROJECT.

Geo. O. Sanford, project manager, Great Falls, Mont.

LOCATION.

Counties: Cascade, Chouteau, Lewis and Clark, Teton.
Townships: 20 to 25 N., Rs. 6 E. to 8 W., Montana meridian.
Railroads: Chicago, Milwaukee & St. Paul; Great Northern.
Project cities and towns and estimated population June 30, 1921: Bole, 70; Fairfield, 160; Fort Shaw, 37; Gilman, 200; Power, 100; Simms, 82; Sloan;[1] Sun River, 26; Vaughn, 20.

WATER SUPPLY.

Source of water supply: Sun River and tributaries, Deep Creek, Bowl Creek, and Basin Creek.
Area of drainage basins: Sun River, 1,070 square miles; Deep Creek, 260 square miles; Bowl Creek, 9 square miles; Basin Creek, 15 square miles.
Annual run-off in acre-feet: North Fork of Sun River, near Augusta, 1905–1915, and at Sun River Diversion Dam, 1916–1920, maximum, 1,127,400; minimum, 311,500; mean, 635,700. Willow Creek, near Augusta, 1906–1920, maximum, 42,460; minimum 3,300; mean, 21,770. Sun River, at Sun River, 1905–1912, and at Fort Shaw, 1913–1920, maximum, 1,289,000; minimum 263,460; mean, 788,700. South Fork of Sun River, near Augusta, 1905–1920, maximum, 159,700; minimum, 12,800; mean, 78,400.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water season of 1921: 40,057 acres.
Area under water-right application season of 1921: 12,973 acres.
Area under rental contracts season of 1921: 21,000 acres.
Area having vested water rights: 145.3 acres.
Length of irrigation season, May 1–October 10: 163 days.
Average elevation of irrigable area: 3,700 feet above sea level.
Rainfall on irrigable area: For 32 years, average, 10.9 inches; for 1920, 9.58 inches.
Temperature at Fort Shaw for 14 years: Maximum, 101° F.; minimum, −49° F.; average annual maximum, 96° F.; average annual minimum, −33° F.; mean, 44° F.
Character of soil of irrigable area: Sandy loam, clay, adobe, and alluvium.
Principal products: Hay, grain, vegetables, live stock, and dairy products.
Principal markets: Great Falls, Seattle, St. Paul, Minneapolis, and Chicago.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: March 26, 1908; November 19, 1910; March 28, 1911; March 2 and July 13, 1912; June 23, 1913; September 24, 1914; March 20 and March 26, 1915; January 15, 1916; March 14, 1917; March 22, 1918; April 29, 1919; February 25, March 24, and May 14, 1920; and February 25, 1921.
Location of lands opened: Tps. 20 and 21 N., Rs. 1 to 3 W., Montana meridian.
Limit of area of farm units: 160 acres.
Duty of water: 2 acre-feet per acre at the farm.
Building charge per acre of irrigable land: $30, $36, $50, $60.
Annual operation and maintenance charge: For the irrigation season of 1921, $2.50 per acre of irrigable land, entitling the water user to 1¼ acre-feet of water per irrigable acre, with an additional charge of 50 cents for each additional acre-foot of water used.

[1] Less than 25.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1905.
Construction recommended by board of engineers February 13, 1906.
Construction authorized by Secretary February 26, 1906.
Fort Shaw Main Canal completed July, 1908.
First irrigation by Reclamation Service season of 1909.
Fort Shaw unit completed December, 1909.
Willow Creek Dam completed, present development, November 7, 1911.
Sun River Diversion Dam completed March, 1915
First irrigation of north side lands season of 1919.
Entire project about 30 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Sun River project, so far approved, provides for the storage of water in Sun River Storage Reservoir on the North Fork of Sun River, in the Willow Creek Reservoir on Willow Creek, and in Pishkun Reservoir north of Sun River; the diversion of water from the North Fork of Sun River through a supply canal for the Pishkun Reservoir; the diversion of water from Sun River, supplemented by stored waters released from Sun River storage and Willow Creek Reservoir, into a canal system watering lands mainly in the abandoned Fort Shaw Military Reservation; and the diversion of water from Pishkun Reservoir into the Sun River Slope Canal, supplying water for lands on the north side of Sun River.

Possible future development may include the diversion of water from Bowl and Basin Creeks, tributaries of Flathead River, across the Continental Divide to Sun River drainage; the diversion of water from the North Fork of Sun River into a supply canal for Willow Creek Reservoir; the diversion of flood waters from Deep Creek into Pishkun Reservoir; the construction of a reservoir on Muddy Creek and of a canal system leading therefrom for the irrigation of lands lying on the north side of Sun River in the vicinity of Vaughn and Manchester; the storage of water in Benton Lake Reservoir for the irrigation of lands lying north of Great Falls; and the diversion of water from the Sun River for the irrigation of lands lying west of Great Falls.

The United States claims all waste, seepage, unappropriated, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The Fort Shaw Division and Willow Creek Reservoir (first development, 16,700 acre-feet) have been completed. The Pishkun Canal (first development, 1,000 second-feet) and Sun River Slope Canal (first development, 500 second-feet) have been completed, but will require further puddling. The Greenfields Canal (first development, 500 second-feet) is also completed. The Greenfields South and Mill Coulee Canals, for a distance of 18 miles, have been excavated but no structures have been constructed. The lateral system for about 25,000 acres in the first portion of the Greenfields Division has been completed with the exception of the extension of the lateral system for deliveries to unsold State lands. Work has been started on the construction of the lateral system for the irrigation of about 2,500 acres of land in the Big Coulee Division, located on the north side of Sun River opposite the town of Simms.

SUMMARY OF GENERAL DATA FOR SUN RIVER PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		170,187
Public land entered to June 30, 1921	52,947	
Public land open to entry June 30, 1921	500	
Public land withdrawn June 30, 1921	38,912	
State land unsold June 30, 1921	10,485	
Railroad land unsold June 30, 1921	249	
Other private land June 30, 1921	67,094	
Acreage Service could have supplied in season of 1920		40,057
Acreage Service can supply in season of 1921		40,057
Estimated acreage Service can supply in season of 1922		42,650
Acreage irrigated, season of 1920		14,780
Acreage cropped, season of 1920		16,350
Crops:		
Value of irrigated crops, season of 1920		$293,600.00
Value of irrigated crops per acre cropped		17.95

Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$148,000.00	
Miscellaneous collections and transfers issued	13,706.44	
Increase of compensation	11,830.95	
Total amount authorized		$173,537.39
Encumbrances—		
Disbursements and transfers received	122,034.48	
Current liabilities	18,198.83	
Contingent liabilities	1,844.17	
Increase of compensation	11,830.95	
Total encumbrances		153,908.43
Unencumbered balance July 1, 1921		19,628.96
Fiscal year 1922—		
Amount specified in appropriation act		687,000.00
Encumbrances in fiscal year 1921—		
Contingent liabilities		23,702.64
Unencumbered balance as of July 1, 1921		663,297.36
Fiscal year 1923—		
Proposed appropriation		345,000.00
Inventories:		
Value of stock on hand		51,517.62
Value of plant and equipment in use		33,278.48
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$3,982,929.24	
Less revenues and adjustments	131,077.47	
Net cost to June 30, 1921		3,851,851.77
Per cent completed on June 30, 1921	30	
Estimated per cent completed on June 30, 1922	30	
Estimated per cent completed on June 30, 1923	34	
Value of construction, water-right contracts, and other resources to repay net cost of project		424,985.84
Revenues held in reserve		28,304.99
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$164,315.34	
Less charges due and miscellaneous revenues	125,774.69	
Deficit		38,540.65

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Discount.	Total.	
Construction charges	$137,046.90	$129,921.25	.....	$129,921.25	$7,125.65
Operation and maintenance charges (public notice)	122,776.75	106,370.90	$2,430.99	108,801.89	13,974.86
Rentals, irrigation water	12,785.41	6,803.86	.....	6,803.86	5,981.55
Rentals, grazing and farming lands	25,573.47	18,768.22	.....	18,768.22	6,805.25
Contractors' freight refunds	14,552.76	14,484.72	.....	14,484.72	68.04
Miscellaneous	104,518.54	16,255.45	.....	16,255.45	88,263.09
Total	417,253.83	292,604.40	2,430.99	295,035.39	122,218.44

CONSTRUCTION DURING FISCAL YEAR.

Pishkun Reservoir.—Storage works for the first development of Pishkun Reservoir, to a water surface elevation of 4,364, were constructed during the fiscal year. This involved the construction of Dike No. 3 and raising No. 4 to elevation 4,370, the excavation of channels for connecting isolated basins within the reservoir site, and the construction of a temporary wasteway structure in Quigley Coulee, and provided for storage of about 3,523 acre-feet of water.

North Side Canal system.—At Elbow Coulee Wasteway a reinforced concrete chute and stilling basin was constructed in November and

December. Placing of concrete in lining of Greenfields Canal between stations 230 and 239 + 65 was resumed on October 1, and completed November 2. The turnout from Greenfields Canal, station 0 + 80, for delivering water to the Big Coulee Division was constructed in December, 1920.

Lateral system.—Installation of turnout gates and timber weirs on the first portion of Greenfields Division was completed by the end of 1920. Minor extensions to laterals in Greenfields Division were completed under informal contracts in the spring of 1921. Contracts have been let and construction work started on the lateral system on the Big Coulee Division, which includes an area of about 2,500 acres of irrigable land.

Permanent improvements.—Four buildings have been moved from abandoned construction camps to the operation and maintenance headquarters at Fairfield and remodeled into two cottages, a storehouse, and a repair shop.

SEEPAGE AND DRAINAGE.

About 2,455 acres on the Fort Shaw Division and about 200 acres on the Greenfields Division are affected by seepage. No drainage construction has been authorized. Petitions were being circulated for the signatures of landowners in the Fort Shaw Irrigation District to authorize the commissioners of the district to execute a contract with the United States for constructing a drainage system. Sentiment is about evenly divided and at the close of the fiscal year a majority of the landowners had not signed the petition.

ECONOMIES OF GOVERNMENT WORK.

The principal work carried on by Government forces during the fiscal year was the development of Pishkun Reservoir to a capacity of 3,523 acre-feet. Work was started August 1, 1920, and completed in April, 1921. It was during this period that the crest of high prices for labor was reached. In the fall of 1920 the rate for teamsters was $5.40 per day, and it was not possible to get men even of average efficiency. Beginning with December a better class of labor was secured and by early spring wages had been reduced to $3.60 per day. Notwithstanding the adverse conditions under which the work was prosecuted, the field cost of material placed in the dikes was 28.6 cents per cubic yard, and for excavation in the connecting channels 26.5 cents. It is the opinion that it would not have been possible to contract this work in the midsummer of 1920 at prices less than 50 per cent in advance of those given.

BOARD MEETINGS.

Date.	Subject.	Personnel.
Sept. 6-10, 1920....	Contract with Fort Shaw Irrigation District.	Chas. P. Williams, Willis J. Egleston, Geo. O. Sanford, and F. G. Hough.

OPERATION AND MAINTENANCE.

Fort Shaw Division.—Precipitation for the season of 1920 was slightly below normal, and it was necessary to draw upon the stored waters in Willow Creek Reservoir for irrigation purposes. At the beginning of the irrigation season Willow Creek Reservoir contained 6,554 acre-feet of water. The maximum storage for the year of 17,054 acre-feet was reached July 25. The total quantity of water diverted into Fort Shaw Canal was 29,959 acre-feet, of which 12,511 acre-feet were delivered to farms for the irrigation of 8,050 acres. The duty of water, disregarding precipitation, was 1.56 acre-feet per acre. The operation and maintenance charge was $1.85 per irrigable acre, whether water was used or not, entitling the user to 1 acre-foot of water per irrigable acre. Additional water was furnished for 50 cents per acre-foot.

Water was turned into the Fort Shaw Canal for the season of 1921 on May 13 and satisfactory service has been maintained since that date. Storage in Willow Creek Reservoir reached 17,290 acre-feet on June 25.

Maintenance work this spring consisted in cleaning some of the larger laterals and replacing decayed, worn-out, and inadequate distribution structures.

The maximum storage and water surface elevations in Willow Creek Reservoir during the past seven irrigation seasons are shown in the following table:

Year.	Capacity.	Maximum storage.	Elevation of water surface.
	Acre-feet.	*Acre-feet.*	
1914	16,700	15,100	4,128.9
1915	16,700	16,000	4,129.15
1916	16,700	19,000	4,132.5
1917	16,700	11,545	4,124.5
1918	16,700	8,042	4,119.8
1919	16,700	9,660	4,122.0
1920	16,700	17,054	4,130.3

Greenfields Division.—Delivery of water for the season of 1920 was begun on June 12 and, except for interruptions amounting to about nine days for making repairs in the system, was continued to August 7. A short run was made about August 17 and the last deliveries of the season from September 1 to 14. A maximum of about 384 second-feet was diverted into Pishkun Canal and of 262 second-feet delivered at Fairfield Drop. A total of 20,560 acre-feet was delivered at Fairfield Drop, of which 9,142 acre-feet were delivered to farms for the irrigation of 6,730 acres. The duty of water, disregarding precipitation, was 1.36 acre-feet per acre. The charge for water service was 75 cents per acre-foot of water delivered.

For the season of 1921 delivery of water was begun May 23 but was interrupted from May 24 to 30 by a bad leak in the concrete lining of Greenfields Canal and was resumed May 30 and continued to the end of the fiscal year. All irrigated crops on the Greenfields Division are in excellent condition.

Maintenance work during the spring of 1921 involved cleaning silt and weeds out of the laterals and canals and repairing leaks in the concrete-lined portions of Greenfields Canal.

Historical review, Sun River project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	16,346	16,322	16,224	14,978	40,057	40,057
Acreage irrigated	4,261	4,717	6,675	7,569	11,496	14,780
Miles of canal operated	100	100	100	96	244	250
Water diverted (acre-feet)	15,538	17,841	25,841	30,087	42,863	75,595
Water delivered to land (acre-feet)	4,653	5,757	9,091	11,193	24,080	21,653
Per acre of land irrigated (acre-feet)	1.1	1.22	1.36	1.48	1.9	1.47

SETTLEMENT.

All land opened to entry on the Fort Shaw Division has been homesteaded. All public land on the Greenfields Division is withdrawn from entry.

Settlement data, Fort Shaw and Greenfields Divisions, Sun River project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	265	254	239	212	[1] 500
Population	436	476	508	542	1,000
Number of irrigable farms	158	176	187	201	354
Operated by owners or managers	103	120	118	151	264
Operated by tenants	55	56	69	50	90
Population	436	476	508	542	861
Number of towns	8	8	8	8	8
Population	179	168	158	155	685
Total population in towns and on farms	615	644	666	697	1,685
Number of public schools	4	4	4	4	17
Number of churches	3	4	4	4	11
Number of banks	1	1	1	1	5
Total capital stock	$20,000	$20,000	$20,000	$20,000	$110,000
Amount of deposits	$85,000	$95,000	$98,000	$110,000	$391,121
Number of depositors	290	310	390	400	1,278
Number of relinquishments	4	1	3	2	1
Number of cancellations	2	.....	.....	.....	1
Homestead entries	5	5	8	8	3

[1] Includes estimated number of private land farms.

PRINCIPAL CROPS.

On the Fort Shaw Division the crops produced were about the same as regards quantity and quality as were harvested in 1919, but the cash return to the farmer was very much less. In 1919 the average value of crops per acre was $42.07 and in many instances the prices actually received were in excess of those used in compiling the crop report. In 1920 the average value per acre based on prices prevailing in December, 1920, was $30.51, but revised figures based on prices received for farm produce during the winter and spring of 1921 give an average return per acre of $21.62. Large quantities of alfalfa had not been sold and a good many tons of potatoes will have to be thrown away. The outlook for good crops in 1921 was very promising.

On the Greenfields Division about one-half of the small grain was destroyed by the pale western cutworm, and this loss, together with the low price received for all farm produce, has left the settlers in a bad financial condition. The average value per acre of irrigated crops, based on December prices, was $17.13, which on account of the decline in prices has been reduced to $14.08. The prospect for good crops in 1921 was excellent. Although the area under cultivation was not quite as large as in 1920 the land had been prepared in a more thorough manner and the acreage in alfalfa had been increased. Water service was good and by making use of the water

the damage from cutworms was reduced to a few hundred acres. The area covered by water-rental applications for the season of 1921 was about 21,000 acres.

Crop report, irrigated farms, Fort Shaw Division, Sun River project, Montana, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	5,193	Ton	10,830	2.08	$10.00	$108,300	$20.80
Alfalfa seed	87	Bushel	122	1.40	12.00	1,468	16.85
Barley	84	...do	2,080	24.7	1.00	2,080	24.75
Clover hay	67	Ton	83	1.2	10.00	830	12.30
Clover seed	82	Bushel	570	6.9	4.80	2,737	33.30
Flax	77	...do	700	9.1	1.20	840	10.90
Garden	52				187.88	9,770	187.88
Hay (except above)	187	Ton	150	.8	10.00	1,500	8.05
Oats	501	Bushel	10,355	20.7	.70	7,250	14.45
Pasture	718	Acre			7.50	5,385	7.50
Potatoes	164	Bushel	27,624	168	.70	19,300	117.70
Wheat	1,170	...do	16,450	14	1.25	20,560	17.55
Miscellaneous	18					1,580	
Total cropped	8,400	Total and average				181,600	21.62
Acres irrigated on 203 farms	8,010						
Town sites, etc.	37						
Miscellaneous	3						
Total irrigated	8,050						

Areas.	Acres.	Farms.	Per cent of division.
Total irrigable area farms reported	11,682	203	84.9
Total irrigated area farms reported:			
Under water-right applications	7,863	198	57.2
Under rental contracts (town sites, etc.).	60	3	.4
Under vested water rights	124	4	.9
Miscellaneous	3		
Total cropped area farms reported	8,400	203	61.1

Crop report, irrigated farms, Greenfields Division, Part 1, Sun River project, Montana, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	382	Ton	521	1.36	$10.00	$5,210	$13.60
Barley	153	Bushel	3,264	21.3	1.00	3,264	21.30
Clover hay	8	Ton	5	.6	10.00	50	6.25
Flax	735	Bushel	4,663	6.3	1.20	5,600	7.55
Garden	18				200.00	3,700	200.08
Hay (except above)	382	Ton	405	1.06	10.00	4,040	10.55
Oats	672	Bushel	14,032	20.9	.70	9,830	14.60
Pasture	319				3.00	957	3.00
Potatoes	50	Bushel	5,581	113	.70	3,910	79.00
Rye	10	...do	160	16	1.00	160	16.00
Wheat	5,200	...do	59,766	11.5	1.25	74,710	14.38
Sunflowers	12	Ton	60	5	5.00	300	25.00
Miscellaneous	9					269	
Total cropped	7,950	Total and average				112,000	14.08
Acres irrigated on 151 farms	6,690						
Miscellaneous	40						
Total irrigated	6,730						

Areas.	Acres.	Farms.	Per cent of division.
Total irrigable area farms reported	16,968	151	67.9
Total irrigated area farms reported:			
Under rental contracts	6,690	151	26.8
Total cropped area farms reported	7,950	151	31.8

PUBLIC NOTICE AND ORDER.

PUBLIC NOTICE, FEBRUARY 25, 1921.

Annual operation and maintenance charges.—In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1921 and thereafter until further notice, against all lands of the Fort Shaw Division, Sun River project, Montana, under public notice, shall be a minimum charge of $2.50 per irrigable acre whether water is used thereon or not, which charge will permit the delivery of not to exceed 1¼ acre-feet of water per irrigable acre; and that additional water will be furnished for 50 cents per acre-foot. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1, for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Sun River project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit				$521.07
Inventory of materials and supplies on hand				51,517.62
Plant and equipment in use				33,278.48
Current accounts receivable				122,218.44
Construction charges not due				258,131.08
Unearned value of contracts				24,546.81
Construction cost of works			$3,905,217.08	
Operation and maintenance added to construction			2,518.90	
Operation and maintenance during construction			74,543.21	
Unadjusted clearing accounts			650.05	
Gross construction cost			3,982,929.24	
Less revenues and adjustments during construction period			131,077.47	
Net construction cost				3,851,851.77
Operation and maintenance cost under public notice	$176,301.48			
Unadjusted clearing accounts	1,802.26			
		$178,103.74		
Less operation and maintenance added to construction		2,518.90		
Gross operation and maintenance cost			175,584.84	
Less revenues and adjustments			123,255.79	
Deficit to Dec. 31, 1920		38,540.65		
Net cost Jan. 1 to June 30, 1921		13,788.40		
				52,329.05
Investment items in transit				246.13
Total debits				4,394,640.45

CREDITS.

Current accounts payable				18,431.54
Contingent and deferred liabilities				25,052.32
Resources for repaying cost of project				424,985.84
Revenues held in reserve				28,304.99
Investment:				
Disbursements and transfers from other projects	$4,354,412.36			
Items in transit	246.13			
Total			$4,354,658.49	
Less collections and transfers to other projects			456,792.73	
Net investment				3,897,865.76
Total credits				4,394,640.45

Construction cost and revenue, Sun River project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys:		
Investigation and surveys	$1,123.93	$55,305.15
Experimental flumes	17.85	638.99
Experimental measuring devices		227.69
Experimental concrete pipe and blocks	14.43	321.26
Total	1,156.21	56,493.09
Storage works:		
Willow Creek Reservoir, dam and outlet work	[1] 2.23	282,318.24
Flowerree feeder canal		155.21
Smith Creek feeder canal		356.23
Warm Springs Reservoir		31,796.93
Bowl and Basin Creeks Canal		1,818.13
Beaver Creek Reservoir	1,005.40	27,091.53
Pishkun Reservoir	34,673.78	70,261.11
Deep Creek feeder canal		407.74
Muddy Creek Reservoir		736.42
Benton Lake Reservoir		1,713.59
Total	35,676.95	416,655.13
Canal system:		
Fort Shaw Canal	[1] 160.00	233,203.52
Pishkun Canal	6,603.30	1,258,341.34
Sun River Slope Canal	5,986.28	692,414.31
Greenfields Main Canal	7,393.13	330,877.85
Teton Canal		19,719.76
Greenfields Lake Canal		472.76
Great Falls Canal	930.56	2,662.65
Total	20,753.27	2,537,692.19
Lateral system:		
Fort Shaw Division	552.70	206,914.91
Sun River Slope Division	805.63	2,185.24
Beale Division	10,747.59	10,747.59
Roberts Division	584.45	584.45
Greenfields Division	11,608.65	539,230.39
Mill Coulee Division		12,549.61
Great Falls Division	1,292.14	1,292.14
Teton Division		454.17
Total	25,591.16	773,958.50
Irrigable lands:		
Fort Shaw Division		3,198.30
Greenfields Division (first part)	542.64	10,396.15
Greenfields Division (second part)	4.32	6,540.21
Beale Division	385.05	385.05
Total	932.01	20,519.71
Permanent improvements:		
Buildings—		
Simms		1,515.16
Gilman		2,200.77
Willow Creek	47.20	935.62
Sun River Diversion		1,306.41
Camp 9		1,801.80
Camp 11		1,607.32
Camp 12		1,748.66
Fairfield	8,648.68	25,566.21
Camp 14	241.88	1,975.39
Bridge across Sun River at Fort Shaw		634.09
Roads—		
Gilman to Sun River Diversion	1,095.57	10,566.12
Sun River Diversion to Warm Springs		18,518.97
Total	10,033.33	68,376.52
Telephone system:		
Great Falls to Willow Creek		7,474.70
Willow Creek to Warm Springs		4,138.67
Willow Creek cut-off to North Side line	47.39	1,143.46
Sun River Division to Greenfields Main Canal, station 225		7,170.34
Greenfields Main Canal, station 225 to Fort Shaw		3,412.70
Greenfields Division local lines	127.44	6,564.94
Lange's Corner to Ashuelot	1,617.13	1,617.13
Total	1,791.96	31,521.94

[1] Contra.

Construction cost and revenue, Sun River project—Continued.

Features.	Fiscal year 1921.	To June 30, 1921.
Operation and maintenance during construction	$34,929.57	$74,543.21
Operation and maintenance charges transferred to and added to construction charges		2,518.90
Unadjusted clearing accounts	[1] 2,561.26	650.05
Gross construction cost, June 30, 1921	128,303.20	3,982,929.24
Less revenues earned during construction period:		
Rentals of buildings	1,513.66	17,231.29
Rentals of irrigation water	6,668.16	11,261.00
Freight refunds	68.04	14,552.76
Other revenues unclassified	4,285.80	4,928.81
Profit on hospital operations	265.00	1,649.21
Loss on farming operations	[1] 56.81	[1] 1,043.20
West Coast Construction Co. & Hans Pederson, suspended contract No. 649		82,497.60
Total revenues	12,743.85	131,077.47
Net construction cost, June 30, 1921	115,559.35	3,851,851.77

[1] Contra.

Operating cost and revenues, Sun River project, Montana, to Dec. 31, 1920—Fort Shaw Division.

Features.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Storage works	$260.46	$165.27	$425.73	$3,981.79	$2,198.07	$6,179.86
Canal system	1,242.48	6,869.74	8,112.22	11,909.30	36,928.74	48,838.04
Lateral system	5,721.92	11,842.75	17,564.67	31,254.29	76,622.28	107,876.57
Unadjusted clearing		1,420.87	1,420.87		1,420.87	1,420.87
Total costs	7,224.86	20,298.63	27,523.49	47,145.38	117,169.96	164,315.34
Unadjusted clearing accounts						
Less unpaid operation and maintenance charges added to construction						2,518.90
Balance						161,796.44
REVENUES.						
Operation and maintenance charges due on contracts with water-right applicants			20,424.78			122,776.75
Advanced payments			23.86			23.86
Penalties on operation and maintenance charges due on contracts with water-right applicants			489.10			1,219.56
Rentals of irrigation water			330.91			1,524.41
Other revenues unclassified, earned during operating period			41.27			142.20
Less discount allowed on operation and maintenance charges due on contracts with water-right applicants			[1] 1,089.36			[1] 2,430.99
Total revenues			20,220.56			123,255.79
Deficit			7,302.93			38,540.65

[1] Contra.

Cost by calendar years.

Year ending Dec. 31—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance. added to construction.	Gross.	
1902	$617.52			$617.52				$617.52
1903	2,022.96			2,022.96				2,022.96
1904	11,543.66			11,543.66				11,543.66
1905	34,821.28			34,821.28				34,821.28
1906	20,824.18			20,824.18				20,824.18
1907	241,530.67			241,530.67				241,530.67
1908	81,108.04			81,108.04	$8,930.75		$8,930.75	90,038.79
1909	56,344.93			56,344.93	14,471.51		14,471.51	70,816.44
1910	148,541.21			148,541.21	9,413.27		9,413.27	157,954.48
1911	100,157.42			100,157.42	6,849.71		6,849.71	107,007.13
1912	211,855.71			211,855.71	9,762.99		9,762.99	221,618.70
1913	232,342.46			232,342.46	12,517.66		12,517.66	244,860.12
1914	907,346.92			907,346.92	11,060.87		11,060.87	918,407.79
1915	848,511.56	$2,810.71		851,322.27	9,736.95	$2,810.71	6,926.24	858,248.51
1916	258,610.53	[1] 68.26		258,542.27	13,193.99	[1] 68.26	13,262.25	271,804.52
1917	137,298.18	[1] 10.95		137,287.23	8,251.61	[1] 10.95	8,262.56	145,549.79
1918	359,178.53	[1] 52.60		359,125.93	16,200.13	[1] 52.60	16,252.73	375,378.66
1919	144,891.31	[1] 160.00	$28,935.56	173,666.87	16,402.41	[1] 160.00	16,562.41	190,229.28
1920	51,915.84		26,362.68	78,278.52	27,523.49		27,523.49	105,802.01
Jan. 1 to June 30, 1921	56,404.22		19,244.97	75,649.19	13,788.40		13,788.40	89,437.59
Total.	3,905,867.13	2,518.90	74,543.21	3,982,929.24	178,103.74	2,518.90	175,584.84	4,158,514.08

[1] Contra.

Cost by fiscal years.

Year ending June 30—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance. added to construction.	Gross.	
1903	$622.52			$622.52				$622.52
1904	2,281.04			2,281.04				2,281.04
1905	29,205.07			29,205.07				29,205.07
1906	26,466.71			26,466.71				26,466.71
1907	94,159.97			94,159.97				94,159.97
1908	210,165.72			210,165.72				210,165.72
1909	44,331.02			44,331.02	$21,275.23		$21,275.23	65,606.25
1910	79,794.09			79,794.09	11,188.34		11,188.34	90,982.43
1911	156,749.52			156,749.52	4,063.00		4,063.00	160,812.52
1912	69,091.12			69,091.12	5,855.26		5,855.26	74,946.38
1913	274,344.16			274,344.16	13,997.50		13,997.50	288,341.66
1914	555,879.09			555,879.09	11,188.54		11,188.54	567,067.63
1915	904,137.39	$2,810.71		906,948.10	11,542.29	$2,810.71	8,731.58	915,679.68
1916	602,097.84			602,097.84	9,882.00		9,882.00	611,979.84
1917	144,800.99	[1] 68.26		144,732.64	10,240.71	[1] 68.26	10,308.97	155,041.61
1918	182,423.23	[1] 63.55		182,359.68	15,611.13	[1] 63.55	15,674.68	198,034.36
1919	321,122.09		$15,497.48	336,619.57	14,753.70		14,753.70	351,373.27
1920	114,822.02	[1] 160.00	24,116.16	138,778.18	26,782.72	[1] 160.00	26,942.72	165,720.90
1921	93,373.63		34,929.57	128,303.20	21,723.32		21,723.32	150,026.52
Total.	3,905,867.13	2,518.90	74,543.21	3,982,929.24	178,103.74	2,518.90	175,584.84	4,158,514.08

[1] Contra.

Statement of general expense for fiscal year 1921 and to June 30, 1921, Sun River project, Montana.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$1,972.68	$2,306.48	$4,279.16	$72,965.35	$8,183.95	$81,149.30
Project office	7,055.72	8,249.52	15,305.24	259,280.33	40,077.94	299,358.27
Denver office	659.48	771.07	1,430.55	16,689.44	2,867.20	19,556.64
District counsel's office	597.95	699.12	1,297.07	7,244.18	1,928.89	9,173.07
Other offices and miscellaneous	.....	.....	.....	50,624.12	1,530.40	52,154.52
Total	10,285.83	12,026.19	22,312.02	406,803.42	54,588.38	461,391.80
Percentage of general expense to gross cost	11.1	21.2	14.9	10.4	21.6	11

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

L. H. Mitchell, project manager, Savage, Mont.

LOCATION.

Counties: Richland and Dawson, Mont.; McKenzie, N. Dak.

Townships: 18 to 26 N., Rs. 56 to 60 E., Montana meridian; 150 to 152 N., R. 104 W., fifth principal meridian.

Railroads: Northern Pacific and Great Northern.

Project cities and towns and estimated population June 30, 1921: Intake, 100; Burns, 25; Savage, 325; Crane, 50; Sidney, 1,500; Fairview, 750; Nohly, Mont., 25; Dore, N. Dak., 30.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 66,000 square miles.

Annual run-off in acre-feet: Yellowstone River at Intake, Mont., 1920, 12,455,000; maximum since 1909, 14,130,000; minimum since 1909, 5,146,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to deliver water, season of 1921: 40,200 acres.

Length of irrigating season: May 1 to October 10—163 days.

Average elevation of irrigable area: 1,900 feet above sea level.

Rainfall on irrigable area: 15-year average, 14.87 inches; 1920, 13.02 inches.

Range of temperature on irrigable area: Since 1906, average of highest, 103° F.; since 1906, average of lowest, −35° F.

Character of soil of irrigable area: Deep sandy loam predominates, some alkali and gumbo.

Principal products: Grain, forage crops, and vegetables.

Principal markets: Minneapolis, St. Paul, and Duluth, Minn.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 21, 1908; March 7, March 24, May 1, August 28, and November 8, 1911; March 1 and April 30, 1912; February 26, May 28, June 23, and July 21, 1913; January 19, March 4, and September 24, 1914; February 5, March 2, March 17, and March 20, 1915; January 29, March 16, and April 12, 1916; March 31, July 8, 1919; June 5, 1920.

Location of lands opened: Tps. 18 and 19 N., R. 57 E.; Tps. 19 and 20 N., R. 58 E.; Tps. 21, 22, 23, 24, and 25 N., R. 59 E.; and T. 24 N., R. 60 E., Montana principal meridian; Tps. 150 and 151 N., R. 104 W., fifth principal meridian.

Limit of area of farm unit: Public, 80 acres; private, 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land, $42.50 and $45, with a supplemental construction charge of $18.46; rental charge for 1920, $2.45 per acre for 1½ acre-feet; additional water at the rate of 50 cents per acre-foot.

Annual operation and maintenance charge is based on the actual cost of operation, which is paid by the irrigation districts.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1903.
Construction recommended by Board of Engineers, April 23, 1904.
Construction authorized by Secretary, May 10, 1904.
First irrigation by Reclamation Service, season of 1909.
Lower Yellowstone Dam completed, February 19, 1910.
Entire project 91 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Lower Yellowstone project provides for the diversion of water from the Yellowstone River at a point 18 miles below Glendive, Mont., into a

canal on the west side of the river which extends down the valley to the confluence of the Yellowstone and Missouri Rivers, conveying water for the irrigation of land lying between the canal and the Yellowstone River. The fall of the water which will be discharged from the main canal into lateral KK at a point 19 miles below the headgates will be utilized to operate turbines direct-connected to centrifugal pumps for raising water to irrigate approximately 3,000 acres of excellent bench land.

The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The completed features are the Lower Yellowstone Dam and diversion works, the main canal for a distance of 66.4 miles, and the complete lateral system in connection therewith.

The features for future construction are the pumping plant, the remaining 5 miles of the main canal, and about 52 miles of laterals, which, when completed, will irrigate approximately 17,360 acres.

SUMMARY OF GENERAL DATA FOR LOWER YELLOWSTONE PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		59,529
Public land entered to June 30, 1921	15,091	
Public land withdrawn on June 30, 1921	2,079	
State land unsold, June 30, 1921	747	
Railroad land unsold, June 30, 1921	97	
Other private land, June 30, 1921	41,515	
Acreage Service could have supplied in season of 1920 (district lands)		40,200
Estimated acreage Service can supply in season 1921		40,200
Estimated acreage Service can supply in season 1922		53,416
Acreage irrigated season of 1920		19,120
Acreage cropped under irrigation season of 1920		19,120
Acreage dry farmed season of 1920		8,000
Crops:		
Value of irrigated crops season of 1920		$584,700.00
Value of irrigated crops per acre cropped		30.60
Value of dry-farmed crops season of 1920		126,900.00
Value of dry-farmed crops per acre cropped		15.85
Drainage:		
Estimated acreage damaged by seepage on June 30, 1921		1,600
Miles of drains built to June 30, 1921—		
Open	4.5	
Closed	1.1	
Total		5.6
Estimated acreage protected by drains, June 30, 1921		1,600
Estimated acreage to be protected by authorized system		1,600
Cost of drainage works to June 30, 1921		$77,306.38
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$83,000.00	
Miscellaneous collections and transfers issued	18,137.69	
Increase of compensation	6,709.63	
Total amount authorized		$107,847.32
Encumbrances—		
Disbursements and transfers received	79,057.54	
Current liabilities	7,078.24	
Increase of compensation	6,728.91	
Total encumbrances		92,864.69
Unencumbered balance on July 1, 1921		14,982.63
Fiscal year 1922—		
Amount specified in appropriation act		340,000.00
Fiscal year 1923—		
Proposed appropriation		180,000.00
Inventories:		
Value of stock on hand		13,982.86
Value of plant and equipment in use		30,410.09
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$2,910,315.21	
Less revenues and adjustments	38,334.73	
Net cost to June 30, 1921		2,871,980.48
Per cent completed on June 30, 1921	91	
Estimated per cent completed on June 30, 1922	100	
Value of construction water-right contracts and other resources to repay net cost of project		1,243,428.90
Revenues held in reserve		3,079.51
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$764,880.55	
Less charges due and miscellaneous revenues	266,115.60	
Deficit		498,764.95

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenues as of June 30, 1921.

	Due.	Collected.			Uncollected.
		Cash.	Discount.	Total.	
Construction charges	$10,060.86	$10,060.86	.....	$10,060.86	.....
Operation and maintenance charges	171,399.19	35,831.20	$4.63	35,835.83	$135,563.36
Rentals, irrigation water	121,910.92	118,799.14	.....	118,799.14	3,111.78
Rentals, grazing and farming lands	2,469.63	2,444.63	.....	2,444.63	25.00
Contractors' freight refunds	21,261.33	21,261.33	.....	21,261.33	.....
Miscellaneous	19,548.68	19,447.72	.....	19,447.72	100.96
Total	346,650.61	207,844.88	4.63	207,849.51	138,801.10

SEEPAGE AND DRAINAGE.

No drains were constructed during the year. The cloud-burst in 1918 deposited large quantities of material in the open portion of Drain No. 1. This material was removed, placing this drain in its normal condition. The total seeped area for the project has increased from 1,276 acres in 1914 to 1,593 acres in 1920. The actual area affected by seepage has not changed materially, but it is evident that the water plane is gradually working towards the surface over large areas and that more drainage ditches will be required in the near future. Field investigations, looking forward to the construction of drainage ditches, were carried on during the year.

OPERATION AND MAINTENANCE.

The first water delivery for the season 1920 was on June 2, and the season closed on September 30. Water was delivered to 375 farms and 19,120 acres were irrigated. This acreage represents a reduction of about 10 per cent from the two previous years and is accounted for principally by the increased rainfall during the growing season.

The unstable banks of the main canal at Indian Coulee and just below Thomas Point were repaired and no difficulty was experienced in making water deliveries promptly. Three drag-line excavators were engaged part time in cleaning silt from the main canal and removing slides, reinforcing the settling banks below Thomas Point, and constructing waste-water channels.

The entire main canal, other than the upper 10 miles, is in good condition for running water to its full capacity. After the project is completed and the additional area brought under irrigation it will be necessary to clean the silt from the upper 10 miles of the canal.

Historical review, Lower Yellowstone project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	42,300	42,288	42,288	42,232	42,167	[1] 40,200
Acreage irrigated	12,656	6,020	15,744	21,075	21,300	19,120
Miles of canals operated	163	151	180	186	188	187
Water diverted (acre-feet)	40,141	27,181	60,205	51,445	70,029	47,375
Water delivered to land (acre-feet)	17,970	7,545	27,842	23,321	26,252	16,633
Per acre of land irrigated (acre-feet)	1.42	1.25	1.77	1.11	1.23	.87

[1] District lands only.

SETTLEMENT.

Although the year 1920 was very trying to farmers and business men owing to the drop in cash value of all crops and stock, it is encouraging to know that none of the 10 banks of the valley closed its doors, not a single business concern failed, and nearly all of the water users are in good shape financially, with stock and equipment to continue the farming of their holdings. There were 33 farms in private ownership that changed hands. One assignment of homestead land was approved by the Land Office.

The increase in settlers, both owners and tenants, can probably be attributed to the succession of dry years, although many tenants have been secured through the establishment of the beet industry.

Settlement data, Lower Yellowstone project, by calendar years.

Item.	[1] 1917	[1] 1918	[1] 1919	[2] 1920
Total number of irrigable farms on the project	514	514	514	543
Population	978	1,120	1,284	1,368
Number of irrigated farms	323	370	405	492
Irrigable farms operated by owners	195	200	204	226
Irrigable farms operated by tenants	52	75	85	94
Irrigable farms having neither owner nor tenant living thereon	162	165	166	172
Number of towns	8	8	8	8
Population	3,310	3,500	3,900	2,850
Total population in towns and on farms	4,288	4,620	5,184	[3] 4,218
Number of public schools	19	19	[4] 12	[4] 12
Number of churches	5	8	13	15
Number of banks	10	10	10	10
Total capital stock of banks	$230,000	$330,000	$330,000	$330,000
Amount of deposits	$2,352,000	$2,000,000	$2,365,000	$2,331,000
Number of depositors	6,390	7,000	7,500	6,500

[1] Project on rental basis.
[2] Project operated under contracts with irrigation districts.
[3] Part of decrease due to exact census.
[4] Decrease in number of schools due to consolidation.

PRINCIPAL CROPS.

During the season of 1920 the acreage in alfalfa decreased 8 per cent owing to winterkilling during the winter of 1919–20. Because of this winterkilling the acreage in sugar beets materially increased, and owing to the drop in the price of alfalfa the returns to the settlers from crops harvested on lands formerly in alfalfa were larger than they would have been if no winterkilling had occurred. The following tabulation shows the relative areas planted to the principal crops during the past eight years:

Year.	Alfalfa.	Wheat.	Oats.	Barley.	Flax.	Beets.	Total.
1913	12	42	14	12	7	.....	87
1914	18	26	16	11	10	.....	81
1915	27	38	15	6	5	.....	91
1916	31	27	14	10	8	.....	90
1917	36	21	9	5	13	.....	84
1918	35	30	10	6	7	.....	88
1919	48	30	8	4	2	.....	92
1920	37	32	11	3	4	3	91

The average return from irrigated crops per acre was $30.60, whereas the average return on the nonirrigated crops was only $15.85 per acre, which clearly shows the value of irrigation on the Lower Yellowstone project.

Irrigated crop report, Lower Yellowstone project, Montana-North Dakota, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Average per unit of yield.	Total.	Average per acre.
Alfalfa	7,030	Ton	14,020	2.0	$12.00	$168,240	$23.93
Alfalfa seed	15	Bushel	15	1.0	15.00	225	15.00
Barley	519	...do	13,629	26.3	.70	9,540	18.38
Beans	44	...do	593	13.3	3.00	1,780	40.43
Beets, sugar	658	Ton	6,594	10.0	[1] 13.00	85,720	130.28
Corn	289	Bushel	8,523	29.5	.80	6,820	23.59
Corn fodder	174	Ton	990	5.7	9.00	8,910	51.20
Flax	671	Bushel	5,172	7.7	1.80	9,310	13.89
Garden	107					13,600	127.10
Hay	825	Ton	962	1.1	10.00	9,620	11.66
Oats	2,141	Bushel	73,803	34.4	.60	44,280	20.68
Pasture	416					4,330	10.40
Potatoes	174	Bushel	24,175	139.0	1.00	24,175	138.93
Wheat	6,042	...do	111,065	18.4	1.75	194,350	32.16
Miscellaneous	73					3,800	52.06
Less duplicated areas	58						
Total irrigated and cropped acreage.	19,120	Total average				584,700	30.60

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	38,290	492	91
Total irrigated area farms reported	19,120	375	45
Irrigated under water-right applications	1	1	
Irrigated under rental contracts	19,119	374	45
Total cropped area farms reported	[2] 27,120	492	64

[1] Includes $1 per ton for top. [2] Irrigated and dry farmed.

Nonirrigated crop report (irrigable land), Lower Yellowstone project, Montana-North Dakota, 1920.

Crop.	Area acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Average per acre.
Alfalfa	915	Ton	747	0.8	$12.00	$8,964	$9.80
Alfalfa seed	550	Bushel	308	.6	15.00	4,624	8.41
Barley	377	...do	8,279	22.0	.70	5,795	15.37
Beans	2	...do	10	5.0	3.00	30	15.00
Beets, sugar	11	Ton	2	.2	13.00	26	2.36
Corn	388	Bushel	7,573	19.5	.80	6,058	15.61
Corn fodder	118	Ton	290	2.5	9.00	2,610	22.12
Flax	1,327	Bushel	8,656	6.5	1.80	15,581	11.74
Garden	20					1,300	65.00
Hay	698	Ton	664	1.0	10.00	6,640	9.51
Oats	1,024	Bushel	32,282	31.6	.60	19,370	18.91
Pasture	308					1,577	5.12
Potatoes	36	Bushel	3,763	104.5	1.00	3,763	104.53
Wheat	2,045	...do	25,621	12.5	1.75	44,850	21.92
Miscellaneous	181					5,712	31.00
Total dry-farmed and cropped acreage.	8,000	Total and average				126,900	15.85

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	38,290	492	91
Total irrigated area farms reported	(1)	(1)	(1)
Under rental contracts	(2)	(2)	(2)
Total cropped area farms reported	[3] 27,120	492	64

[1] Dry crop only. [2] See preceding table. [3] Irrigated and dry farmed.

FINANCIAL STATEMENT.

Condensed financial statement, June 30, 1921, Lower Yellowstone project.

DEBITS.

Collections on hand and in special deposit			$525.62
Inventory of materials and supplies on hand			13,982.86
Plant and equipment in use			30,410.09
Current accounts receivable			138,801.10
Construction charges not due			1,202,096.20
Construction cost of works		$2,908,522.41	
Unadjusted clearing accounts		1,792.80	
Gross construction cost		2,910,315.21	
Less revenues and adjustments during construction period		38,334.73	
Net construction cost			2,871,980.48
Operation and maintenance cost (public notice)		$798,328.37	
Less revenues and adjustments		298,995.75	
Deficit to Dec. 31, 1920	$498,764.95		
Net cost Jan. 1 to June 30, 1921	567.67		
			499,332.62
Investment items in transit			61.20
Total debits			4,757,190.17

CREDITS.

Current accounts payable			48,174.35
Contingent and deferred liabilities			525.62
Resources for repaying cost of project			1,243,428.90
Revenues held in reserve			3,079.51
Investment:			
Disbursements and transfers from other projects	$3,780,766.05		
Items in transit	40.92		
Total		$3,780,806.97	
Less collections and transfers to other projects	$318,845.46		
Items in transit	[1] 20.28		
Total		318,825.18	
Net investment			3,461,981.79
Total credits			4,757,190.17

Construction cost and revenue, Lower Yellowstone project.

Principal features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys	[1] $9,296.90	$56,709.64
Canal system:		
Diversion dam		338,881.76
Main Canal—		
Headworks		79,533.66
0 to mile 7.6		355,381.79
7.6 to mile 15.9		353,138.68
15.9 to mile 24.5		282,687.61
24.5 to mile 33.6		119,504.45
Divisions 5, 6, and 7		219,536.50
Structures		539,138.44
Highway bridges and approaches		77,850.17
Right of way		17,376.28
Miscellaneous		38,036.38
Total for canal system		2,421,065.72
Lateral system		290,069.83
Drainage system and measuring devices		77,306.38
Farm units and surveys		1,016.24
Permanent improvements and land		39,536.38
Telephone system		22,818.22
Operation and maintenance charges transferred to and compounded with construction charges	[1] 1,700.05	
Unadjusted clearing accounts	1,792.80	1,792.80
Gross construction cost, June 30, 1921	[1] 9,204.15	2,910,315.21
Less revenues earned during construction period:		
Rentals of buildings	9,542.31	9,964.31
Contractors' freight refunds		21,261.33
Miscellaneous	2,778.05	7,109.09
Total revenues	12,320.36	38,334.73
Net construction cost	[1] 21,524.51	2,871,980.48

[1] Contra.

Operating cost and revenue, Lower Yellowstone project.

Features.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Canal system: Main Canal	$1,658.81	$16,557.59	$18,216.40	$37,876.30	$180,209.78	$218,086.08
Lateral system	3,520.88	21,237.18	24,758.06	33,498.43	160,708.53	194,206.96
Drainage system		53.53	53.53		225.60	225.60
Cleaning silt: Main Canal		23,607.11	23,607.11		35,874.86	35,874.86
Crane Creek embankment		616.40	616.40		616.40	616.40
Crane Creek Drain		2,184.17	2,184.17		2,184.17	2,184.17
Nohle Lake Drain		2,412.51	2,412.51		2,412.51	2,412.51
Damage claims		313.35	313.35		610.59	610.59
Slide, Indian Coulee					1,426.40	1,426.40
Maintenance of permanent improvements					2,739.26	2,739.26
Farm operation and maintenance					13,987.33	13,987.33
Diversion dam at intake					109,283.15	109,283.15
Repairs due to cloud-burst of Aug. 15, 1918					36,553.20	36,553.20
Undistributed expenses:						
Camp maintenance		1,677.07	1,677.07		60,549.29	60,549.29
Superintendence and accounts		3,585.18	3,585.18		19,113.99	19,113.99
Engineering and inspection		2,544.82	2,544.82		2,544.82	2,544.82
General expense		12,824.60	12,824.60		52,950.78	52,950.78
Telephone operation and maintenance		642.64	642.64		11,515.16	11,515.16
Total undistributed expenses		21,274.31	21,274.31		146,674.04	146,674.04
Subtotal	5,179.69	88,256.15	93,435.84	71,374.73	693,505.82	764,880.55
Operation and maintenance charges added to construction charges		1,700.05	1,700.05			
Total	5,179.69	89,956.20	95,135.89	71,374.73	693,505.82	764,880.55
REVENUE.						
Operation and maintenance charges accrued on contracts with water-right applicants						138,467.80
Operation and maintenance charges paid in advance by water-right applicants						622.21
Operation and maintenance charges forfeited by water-right applicants						440.00
Penalties on operation and maintenance charges accrued on contracts with water-right applicants						2.59
Rentals of building during operating period			[1] 8,137.26			
Rentals, irrigation water			809.93			122,016.69
Rentals, telephone, and tolls during operating period						499.97
Other revenue unclassified earned during operating period			2,617.16			4,070.97
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants						[1] 4.63
Total			[1] 4,710.17			266,115.60
Difference, deficit			99,846.06			498,764.95

[1] Contra.

Costs by calendar years, Lower Yellowstone project.

	Construction.	Operation and maintenance.	Grand total.
Year ending Dec. 31—			
1904	$35,237.74	.....	$35,237.74
1905	154,318.40	.....	154,318.40
1906	396,619.33	.....	396,619.33
1907	1,015,975.33	.....	1,015,975.33
1908	919,876.95	.....	919,876.95
1909	200,754.90	$109,192.21	309,947.11
1910	40,775.64	51,124.14	91,899.78
1911	9,132.04	68,140.91	77,272.95
1912	3,897.73	128,399.74	132,297.47
1913	65,154.83	36,566.74	101,721.57
1914	37,015.03	26,699.88	63,714.91
1915	14,180.56	27,900.80	42,081.36
1916	10,559.94	24,886.16	35,446.10
1917	9,081.88	32,411.78	41,493.66
1918	208.56	74,998.75	75,207.31
1919	2,342.77	89,423.55	91,766.32
1920	[1] 6,609.22	95,135.89	88,526.67
January to June 30, 1921	1,792.80	33,447.82	35,240.62
Total	2,910,315.21	798,328.37	3,708,643.58

[1] Contra.

Costs by fiscal years, Lower Yellowstone project.

	Construction.	Operation and maintenance.	Grand total.
Year ending June 30—			
1906	$294,916.59	.....	$294,916.59
1907	619,569.88	.....	619,569.88
1908	978,590.28	.....	978,590.28
1909	701,342.76	$51,080.95	752,423.71
1910	166,404.76	84,490.87	250,895.63
1911	10,847.88	50,436.92	61,284.80
1912	1,024.98	122,486.08	123,511.06
1913	13,288.54	71,520.75	84,809.29
1914	69,984.50	30,712.90	100,697.40
1915	36,657.00	21,327.09	57,984.09
1916	591.31	29,965.81	30,557.12
1917	19,411.12	24,494.88	43,906.00
1918	167.25	49,213.37	49,380.62
1919	2,293.58	88,298.89	90,592.47
1920	4,428.93	87,364.90	91,793.83
1921	[1] 9,204.15	86,934.96	77,730.81
Total	2,910,315.21	798,328.37	3,708,643.58

[1] Contra.

Statement of general expense for fiscal year 1921, and to June 30, 1921, Lower Yellowstone project.

Office.	Fiscal year, 1921.		To June 30, 1921.		
	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$2,534.94	$2,534.94	$50,238.74	$40,794.62	$91,033.36
Project office	8,911.87	8,911.87	67,106.20	158,277.10	225,383.30
Denver office	1,116.02	1,116.02	.....	6,356.47	6,356.47
District counsel's office	1,170.27	1,170.27	.....	6,145.52	6,145.52
Other offices and miscellaneous	320.41	320.41	12,985.10	320.41	13,305.51
Total	14,053.51	14,053.51	130,330.04	211,894.12	342,224.16
Percentage of general expense to gross cost.	16.2	16.2	4.5	26.5	9.2

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

ANDREW WEISS, project manager, Mitchell, Nebr.

LOCATION.

Counties: Sioux, Scotts Bluff, Banner, and Morrill, Nebr.; Natrona, Carbon, Converse, Goshen, and Platte, Wyo.

Townships: 19 to 27 N., Rs. 48 to 67 W.; 26 to 30 N., Rs. 83 to 85 W., sixth principal meridian.

Railroads: Chicago, Burlington & Quincy; Union Pacific; Chicago & North Western; Colorado & Southern.

Project cities and towns and estimated population June 30, 1921: Bridgeport, 1,250; Northport, 80; Bayard, 2,150; Minatare, 660; Scottsbluff, 6,950; Mitchell, 1,300; Morrill, 775; Henry, 130; McGrew, 130; Melbeta, 130; Gering, 2,500; Haig, 50; and Lyman, Nebr., 20; Torrington, 1,300; Lingle, 365; Fort Laramie, 100; Guernsey, 372; Yoder, 15; and Casper, Wyo., 11,447.

WATER SUPPLY.

Source of water supply: North Platte River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre-feet of North Platte River: At Pathfinder, Wyo. (12,000 square miles), 1906 to 1920, maximum, 2,426,180; minimum, 813,415; mean, 1,465,389. At Whalen, Wyo. (16,200 square miles), 1909 to 1920, maximum, 2,711,000; minimum, 982,790; mean, 1,652,816.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Length of irrigating season: From April 1 to September 30—183 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Rainfall on irrigable area: 11-year average, 14.74 inches; 1920, 15.5 inches.

Average of highest recorded temperature for 11 years, 98° F.; average of lowest recorded temperature for 11 years, −24° F.

Character of soil of irrigable area: The soil varies from the sandy soils on some portions of the Interstate Division to the heavier or gumbo soils on the Fort Laramie Division. A greater part of the soil is a sandy loam.

Principal products: Alfalfa, cereals, corn, sugar beets, and potatoes.

Principal markets: Omaha, Nebr.; Kansas City and St. Joseph, Mo.; Denver, Colo.; central Wyoming.

INTERSTATE DIVISION.

Area for which the service is prepared to supply water, season of 1921, 128,813.46 acres.

Area under water-right applications and rental contracts, season of 1920, 123,990.46 acres. Both of the above totals include 16,706 acres under North Platte Canal Colonization Co. tract subject to operation and maintenance charges.

FORT LARAMIE DIVISION.

Area for which the service is prepared to supply water, season of 1921, 16,232 acres.

Area under rental contracts, season of 1920, 11,493 acres.

LANDS OPENED TO IRRIGATION.

INTERSTATE DIVISION.

Dates of public notices and orders: July 29, 1907; May 29, June 16, November 12, 1908; March 3, March 27, June 2, 1909; March 12, April 4, June 6, June 25, July 2, September 10, 1910; March 7, March 24, April 21, December 30, 1911; March 13, March 14, March 19, May 23, June 24, September 5, 1912; February 5, March 11 (2), March 29, June 16, June 23, July 13, September 4, 1913; September 24, 1914; February

27, April 23, 1915; January 13, February 10, February 24, March 16, May 16, 1916; March 16, March 22, 1917; April 3, 1918; March 11, 1919; March 11, December 21, 1920; and March 3, 1921.

Location of lands opened: Ts. 21 to 26 N., Rs. 51 to 65 W., sixth principal meridian.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: Two and one-half acre-feet per acre per annum at the farm.

Charges per acre of irrigable land: Building, $45, $55, and $75; annual operation and maintenance, $1.40 per acre-foot for water used, with a minimum charge of $2.80 per acre.

FORT LARAMIE DIVISION.

Dates of public orders: March 12, 1918; January 15, February 14, 1920; March 3, 1921.

Location of lands opened: Ts. 23 to 26 N., Rs. 61 to 64 W., sixth principal meridian.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: Two and one-half acre-feet per acre per annum at the farm.

Charges for rental water: A minimum charge of $1.70 per acre of irrigable land, the payment of which entitles the applicant to 2 acre-feet of water per acre. Additional water is furnished at the rate of $1 per acre-foot.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.

Construction recommended by director March 7, 1903.

Construction conditionally authorized by Secretary March 14, 1903.

First irrigation by Reclamation Service, season of 1908.

Whalen Diversion Dam completed February, 1909.

Pathfinder Dam completed June, 1909.

Pathfinder Dike completed May, 1911.

Interstate Canal, 165 miles completed June 30, 1914.

Contract for construction of Northport Division executed February 24, 1919.

Contract for construction of Gering and Fort Laramie Irrigation District executed May 25, 1920.

Storage Division, 95.0 per cent completed June 30, 1921.

Interstate Division, 95.0 per cent completed June 30, 1921.

Fort Laramie Division, 47.0 per cent completed June 30, 1921.

Northport Division, 46.0 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the North Platte project provides for the storage of flood waters of North Platte River in a reservoir controlled by the Pathfinder Dam, about 3 miles below the junction of the North Platte and Sweetwater Rivers and 50 miles southwest of Casper, Wyo., and in smaller reservoirs along the canal lines; and the diversion of water from North Platte River by a dam near Whalen, Wyo., into the Interstate Canal, supplying water for lands on the north side of the river and into the Fort Laramie Canal, watering lands on the south side of the river. The Northport Division on the north side of the river in the vicinity of Northport, Nebr., will be watered from an extension of the Tri-State Canal. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The completed features are: Pathfinder Reservoir; Whalen Diversion Dam; the first three divisions of the Interstate Canal; lateral systems of districts 1, 2, and 3 of the Interstate Canal system; Reservoir No. 1, known as Lake Alice; Reservoir No. 3, known as Lake Minatare. The Fort Laramie Canal system, covering approximately 107,000 acres, and the Northport Canal system, covering approximately 15,000 acres, are now under construction.

SUMMARY OF GENERAL DATA FOR NORTH PLATTE PROJECT TO END OF FISCAL YEAR 1921.

	Interstate.	Fort Laramie.	Northport.	Total.
Areas:				
Irrigable acreage when project is complete	129,224	107,000	15,000	251,224
Public land entered to June 30, 1921	82,360	30,779	6,500	119,639
Public land withdrawn on June 30, 1921	411	29,421	500	30,332
State land unsold, June 30, 1921	529	7,325	1,400	9,254
Private land, June 30, 1921	45,924	39,475	6,600	91,999
Acreage Service could have supplied in season of 1920	128,918	16,232	.....	145,150
Estimated acreage Service can supply in season of 1921	128,813	16,232	.....	145,045
Estimated acreage Service can supply in season of 1922	130,347	44,000	9,000	183,347
Acreage irrigated, season 1920	96,540	8,530	[1] 1,220	106,290
Acreage cropped under irrigation, season 1920	95,200	8,490	[1] 1,220	104,910
Crops (excluding lands of North Platte Canal & Colonization Co. on Interstate Division):				
Value of irrigated crops, season 1920	$4,043,600.00	$253,180.00	.....	$4,296,780.00
Value of irrigated crops per acre cropped	47.10	30.00	.....	.....

[1] Irrigated under arrangement made by Northport District with Farmers Irrigation District and not through Northport Canal. Lateral system already constructed partly utilized in distributing water.

Finances:			
Appropriations—			
Fiscal year 1921—			
Amount specified in appropriation act		$1,000,000.00	
Miscellaneous collections and transfers issued		116,117.39	
Special appropriations		5,150.00	
Increase of compensation		97,519.33	
Total amount authorized			$1,218,786.72
Encumbrances—			
Disbursements and transfers received		959,574.80	
Current liabilities		92,881.26	
Contingent liabilities		58,386.00	
Increase of compensation		97,534.66	
Total encumbrances			1,208,376.72
Unencumbered balance as of July 1, 1921			10,410.00
Fiscal year 1922—			
Amount specified in appropriation act			2,115,000.00
Encumbrances in fiscal year 1921—			
Disbursements and transfers received			168,404.59
Unencumbered balance as of July 1, 1921			1,946,595.41
Fiscal year 1923—			
Proposed appropriation			1,690,000.00
Inventories:			
Value of stock on hand			123,075.63
Value of plant and equipment in use			635,302.47
Construction cost and per cent completed:			
Gross cost to June 30, 1921		$11,779,478.51	
Less revenues and adjustments		111,908.78	
Net cost to June 30, 1921			11,667,569.73
Per cent completed on June 30, 1921—			
Interstate Division	95		
Fort Laramie Division	48		
Northport Division	45		
Estimated per cent complete by June 30, 1922—			
Interstate Division	96		
Fort Laramie Division	54		
Northport Division	83		
Value of construction water-right contracts and other resources			7,026,825.88
Revenues held in reserve			117,987.36
Operation and maintenance costs:			
Gross cost to Dec. 31, 1920		$1,453,788.85	
Less charges due and miscellaneous		1,388,612.87	
Deficit to Dec. 31, 1920			65,175.98

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges	$1,622,831.70	$1,341,893.06	.....	$33,711.85	$1,375,604.91	$247,226.79
Operation and maintenance charges (public notice)	1,384,836.49	1,125,591.99	$27,369.25	9,231.66	1,162,192.90	222,643.59
Rentals, irrigation water	108,273.21	105,528.01	.....	2.00	105,530.01	2,743.20
Rentals, power	27,266.27	17,144.83	.....	7,873.97	25,018.80	2,247.47
Rentals, grazing and farming lands	61,079.17	58,044.67	.....	.....	58,044.67	3,034.50
Contractors' freight refunds	37,055.55	36,953.04	.....	.....	36,953.04	102.51
Miscellaneous	131,740.28	128,287.40	.....	.....	128,287.40	3,452.88
Total	3,371,975.95	2,813,443.00	27,369.25	50,819.48	2,891,631.73	481,450.94

CONSTRUCTION DURING FISCAL YEAR.

STORAGE DIVISION.

Work progressed on the construction of the North Tunnel outlet works at Pathfinder Dam throughout the year. At the end of the fiscal year 3,415 cubic yards of class 3 material had been removed from the tunnel and valve house cave and 280 cubic yards of concrete had been placed in the outlet conduits and appurtenances. The concrete plug in the North Tunnel below the gates was completed. The contract for hauling the two 58-inch balanced needle valves and other miscellaneous supplies from Casper, Wyoming, to Pathfinder Dam was let to the White Motor Truck Co., of Casper. The contract was completed April 16, 1921.

INTERSTATE DIVISION.

A one-car garage was built in the city of Mitchell for the use of the district counsel.

A few small lateral extensions were built on various parts of the unit.

An addition to the machine shop at the Mitchell headquarters was completed.

FORT LARAMIE DIVISION.

Main Canal.—Electric drag lines Nos. 131343 and 131345 continued work on the Main Canal throughout the year. Electric drag line No. 131312 commenced work on May 6, after completing the excavation of the East Springer Lateral. Good progress has been made by these machines and it is expected that drag-line excavation will be completed on the Main Canal in Wyoming sometime in the fall of 1921; 824,071 cubic yards of material were excavated during the year at an average field cost of 9.9 cents per cubic yard.

The following structures on the Main Canal were completed during the year by Government forces: Three highway bridges over the canal, one service bridge at Whalen Dam, Springer Lateral, and one smaller lateral turnout, one check, four 30-inch concrete siphons under the canal for private ditches, the Horse Creek Wasteway and appurtenant structures, and the driving of 18,000 feet b. m. of sheet piling at Whalen Dam.

Lateral system.—Electric drag line No. 131312 completed the excavation on Main Springer Lateral on July 26, 1920. The yardage moved during the fiscal year was 14,750 cubic yards at an average cost of 10.3 cents per cubic yard.

Electric drag line No. 131312 commenced excavation upon the East Springer Lateral on August 27, 1920, and completed the excavation on April 7, 1921; 239,360 cubic yards were excavated at an average field cost of 10.3 cents per cubic yard.

Electric drag line No. 131344 completed the excavation of Horse Creek Lateral on August 6, 1920. During the fiscal year 67,310 cubic yards of material were excavated at an average cost of 9.2 cents per cubic yard.

The following is a summary of electric drag-line operations on the division to June 30, 1921:

Number of 8-hour shifts	4,504½
Linear miles excavated:	
Main Canal	15.59
Laterals	52.78
Drains	22.75
Total	91.12
Cubic yards excavation, class 1	2,793,305
Cubic yards excavation, class 2	285,208
Cubic yards excavation, class 3	16,990
Average cubic yards per shift	687
Power used, kilowatt-hours	1,664,800
Average kilowatt-hour per cubic yard	0.53

Excellent progress was made on the construction of lateral and sublateral structures. It is expected to have all land in Wyoming west of Horse Creek ready for the 1922 irrigation season.

During the year the Lateral 35.4 Siphon was completed and by the end of the year all lateral and sublateral structures under the Cherry Creek Lateral system were completed except those in the Upper Cherry Creek Basin.

Power system.—The Lingle power plant continued in operation with three shifts daily throughout the entire fiscal year. In addition to furnishing power for the four drag lines operating on this unit, and to the repair shops at Kiowa Camp, this plant furnished power for lighting the cities of Lingle and Torrington, Wyo., and Morrill and Mitchell, Nebr.

The following is a summary of operation data for the plant to June 30, 1921:

Operated	hours	17,200
Power generated, total	kilowatt-hours	4,152,395
Power wasted through rheostat	do	431,520
Power lost in transmission	do	875,601
Power used, total	do	2,845,274
Power used, drag line No. 131312	do	376,000
Power used, drag line No. 131313	do	444,800
Power used, drag line No. 131343	do	396,600
Power used, drag line No. 131344	do	39,900
Power used, drag line No. 131345	do	407,500
Power used, installing drag lines	do	17,350
Power used, Kiowa repair shops	do	93,053
Power used, Kiowa Camp	do	113,621
Power used, Dutch Flats drainage	do	14,500

Power used on other work	kilowatt-hours	6,050
Power sold to Lingle, Wyo	do	19,000
Power sold to Torrington, Wyo	do	519,100
Power sold to Morrill, Nebr	do	106,100
Power sold to Mitchell, Nebr	do	291,700
Percentage lost in transmission	per cent	21.1
Average plant load	kilowatts	242
Capacity factor	per cent	32.3
Peak load observed	kilowatts	790
Average flow through plant	second-feet	44.4
Total water used	acre-feet	62,983

Transmission lines.—At the end of the fiscal year 55 miles of permanent high-tension line, 8 miles of temporary high-tension line, and 24 miles of low-tension lines were being operated. The line construction during the year included the dismantling and rebuilding of some 53 miles of low-tension line. Four permanent substations were operated throughout the year.

NORTHPORT DIVISION.

Main Canal.—Excavation on the Northport Canal progressed throughout the year in a satisfactory manner. By the end of the year electric drag line No. 131344, which had been transferred from the Fort Laramie Division, and the Bucyrus class 14 gasoline drag line had moved 369,924 cubic yards of material at an average field cost of 16 cents per cubic yard. The 40-foot cut between station 195 and station 204 required a large amount of rehandling which is not included in the yardage above given. During the year the elevating grader outfit placed 80,088 cubic yards in fills on the canal ahead of the drag lines.

During the year the following canal structures were completed: 12 culverts; 1 highway bridge, at station 213; 1 siphon at station 253; and West Indian Creek Siphon at station 398.

Lateral system.—Work on lateral excavation was handled by contract, the contracts being let in small schedules in order that local dirt work contractors might be given the work.

During the year contracts have been let up to Lateral 21.7 M., about 7 miles northeast of Bridgeport, Nebr., and all lateral excavation west of the Chicago, Burlington & Quincy Railroad tracks was completed.

Good progress was made on lateral and sublateral structures during the year and a large amount of material has been delivered. At the end of the year structures on all laterals west of the Chicago, Burlington & Quincy Railroad tracks were in process of construction.

Power system.—On September 25 the Bridgeport Power & Light Co. commenced furnishing electrical energy to operate the electric drag line and to light Indian Creek Camp. Service continued throughout the remainder of the year for two 8-hour shifts daily.

The following is a summary of operation data to the end of the fiscal year:

Power delivered at power plant	kilowatt-hours	174,835
Power lost in transmission	do	29,500
Power used by drag line No. 131344	do	138,817
Power used in moving to new work	do	1,853
Power used by Indian Creek Camp	do	5,315
Power used in meter tests	do	100
Percentage lost in transmission	per cent	17

Transmission lines.—At the end of the year 6.2 miles of temporary high-tension transmission lines were in operation. During the year some 5 miles of low-tension lines were dismantled and reconstructed.

Telephone system.—During the year 9 miles of telephone line were constructed to connect Indian Creek Camp with Bridgeport, Nebr.

Camp construction.—The construction of Indian Creek Camp was completed during September, 1920. This camp consists of three permanent cottages, an office, several bunk houses, a portable barn, and water system.

SEEPAGE AND DRAINAGE.

INTERSTATE DIVISION.

Surveys and investigations incident to the location, design, and construction of drainage works were continued during the year. Borings were made in the areas affected, and the elevation of the water was measured in domestic wells on the higher ground surrounding the areas. From these data the elevations and periodic variations of the water table were determined and subsoil conditions affecting the law of underground water were studied.

Work was in progress on the Lower Nine Mile Drain under supplemental agreement with the Farmers' Irrigation District. During the year 52,213 cubic yards of material were excavated and 2.9 miles of drain completed. Work was commenced on the Minatare Drain on May 10, 1921. At the end of the year 15,176 cubic yards had been excavated. This drain is a part of the Lower Nine Mile system.

Work was completed on the Dunham-Andrews system on January 14, 1921. During the year 111,908 cubic yards of material were excavated and 3.7 miles of drain completed. One highway bridge at station 123 was built during the year.

The Austin trench machine excavated and laid 0.87 mile of 12-inch tile line on the Winters Creek Closed Drain during the year.

Work was begun on the Dutch Flats Outlet Channel on March 10, 1921. The P. & H. drag line No. 121157 excavated 63,161 cubic yards of material and had completed 3.7 miles of open drain by the end of the fiscal year. The lower end of this outlet was completed by contract, 6,275 cubic yards of material being handled in this manner.

The contract with the Kelly Well Co. for the construction of three drainage wells on Dutch Flats was completed October 4, 1921, and pumping by well No. 1 began October 9. Tests made in December, 1920, showed discharges of 1.58 and 1.70 second-feet for a continuous run of 78 and 52 hours, respectively. The contract for the construction of three stucco pump houses for these wells was let to a local contractor on June 15, 1921. The houses will be completed during July, 1921.

The excavation of a tile line for a closed drain in the upper Sheep Creek area was let to a local contractor, the yardage involved amounting to 6,100 cubic yards. The tile was laid by Government forces. The back fill of the trench was handled by contract and at the end of the year was 35 per cent complete.

FORT LARAMIE DIVISION.

Work continued throughout the year by electric drag line No. 131313 on the excavation of Cherry Creek Drain and its branches. At the end of the year 22.75 miles of drain had been completed, which involved the excavation of 743,243 cubic yards of material. The machine averaged 745 cubic yards per 8-hour shift and consumed 0.60 kilowatt hour per cubic yard excavated.

During the year the following structures were completed: Four highway bridges at stations 497, 536, 638, and 727. A concrete arch highway bridge at station 65 was constructed by contract and was completed May 28, 1921. A permanent 33-inch concrete siphon was built to replace a temporary wooden flume carrying the Rock Ranch Canal over Cherry Creek Drain. The latter structure was washed out during the heavy rains the latter part of May, 1921.

BOARD MEETINGS.

Date.	Subject.	Personnel.
Jan. 17, 1921	Unification of Katzer irrigation system	Chas. P. Williams, J. L. Burkholder.
Do	Cooperative drainage and flood-water control, Winters Creek.	Andrew Weiss, H. W. Bashore.
Do	Supplemental contract with Morrill Drainage District.	Do.
Jan. 18, 1921	Cooperative drainage work, Gering Irrigation District.	Do.
Do	Cooperative drainage contract, Tub Springs Outlet.	Do.
Do	Outlet for Dry Spottedtail Creek	Do.

OPERATION AND MAINTENANCE.

INTERSTATE DIVISION.

The system as operated during the past season consisted of the Pathfinder Reservoir, the Whalen Diversion Dam, 95 miles of Main Canal, Lake Alice, 5 miles of Reservoir Supply Canal, Lake Minatare, Winters Creek Lake, 37 miles of high-line canal, 42 miles of low-line canal, and 628 miles of laterals.

In 1920 water to the amount of 175,153 acre-feet was delivered to 1,325 farms, containing approximately 85,830 acres in crops, exclusive of the lands of the North Platte Canal & Colonization Co., to which 40,120 acre-feet of water were delivered for the irrigation of 125 farms, containing approximately 9,630 acres in crops. The average amount of water used upon the land under the Interstate Division was 1.99 acre-feet per acre and upon the land of the North Platte Canal & Colonization Co. 4.17 acre-feet per acre. The total diversion at Whalen Dam during the irrigation season of 1920 was 409,295 acre-feet.

The diversion into the Interstate Canal was gradually increased from 1,500 second-feet on June 10 to 1,750 second-feet on August 2, after which it was gradually reduced 900 second-feet at the end of the season, October 29, 1920. A greater part of the water delivered in October was used to fill Lakes Alice and Minatare and Winters Creek Lake. On account of the late spring and numerous rains no water was diverted into the canal until May 22.

The storage in Pathfinder Reservoir gradually increased from 222,110 acre-feet on January 31 to 1,153,050 acre-feet on June 18, then gradually receding to 691,370 acre-feet on December 31, 1920.

Historical review, Interstate Division, North Platte project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	[1] 129,684	[1] 129,891	[1] 129,891	[1] 129,778	[1] 129,715	[1] 129,639
Acreage irrigated	[1] 78,057	[1] 84,208	[1] 92,553	[1] 97,908	[1] 99,418	[1] 96,540
Miles of canal operated	800	800	805	805	805	807
Water delivered to land (acre-feet)	[2] 96,467	[2] 164,240	[2] 177,472	[2] 204,819	[2] 201,505	[2] 175,153
Per acre of land irrigated (acre-feet)	[2] 1.38	[2] 2.17	[2] 2.13	[2] 2.31	[2] 2.27	[2] 1.99

[1] Includes North Platte Canal & Colonization Co. lands.
[2] Exclusive of lands under North Platte Canal & Colonization Co. tract.

FORT LARAMIE DIVISION.

Water was carried through 67.5 miles of canal, 63 miles of laterals, and approximately 8,500 acres of land were irrigated; 263,172 acre-feet were diverted in the Main Canal at Whalen Dam, of which amount 176,771 acre-feet were wasted through the sand trap and wasteways, 30,525 acre-feet were used by the Lingle power plant; 16,755 acre-feet were used on the land. About 25 second-feet were delivered to 10 farms in the Horse Creek District through private ditches diverting from Horse Creek. Water was delivered on a rental basis only. During the irrigation season, June 1 to October 1, the canal discharge varied from 100 to 500 second-feet, with an average of about 300 second-feet. After the latter date the canal was operated to the wasteway at Mile 25.5 for the operation of the Lingle power plant only. No serious difficulty was experienced in operating the canal during the winter months.

Historical review, Fort Laramie Division, North Platte project, by calendar years.

Item.	1918	1919	1920
Acreage for which Service was to prepared to supply water	12,132	12,132	16,232
Acreage irrigated	4,865	6,258	8,530
Miles of canal operated	70	79	130
Water delivered to the land (acre-feet)	5,037	18,050	16,755
Per acre of land irrigated (acre-feet)	1.04	2.89	1.97

NORTHPORT DIVISION.

Water was delivered to lands in the Northport Division under contract dated June 1, 1920, between the district and the United States. Deliveries were made at the weir in the Northport Canal and from a lateral in NE. ¼ sec. 3, T. 20 N., R. 51 W.; 1,992 second-feet were delivered and 1,526 second-feet were used. The first water for irrigation purposes was received on June 18. Deliveries continued without interruption throughout the remainder of the season. Approximately 1,220 acres were irrigated, but as the users were nearly all new to the use of irrigation, very little was thoroughly irrigated.

Historical review, Northport Division, North Platte project, by calendar years.

Item.	1920
Acreage for which Service was prepared to supply water	1,600
Acreage irrigated	1,220
Water delivered to the land (acre-feet)	1,526
Per acre of land irrigated (acre-feet)	1.27

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 22.

SETTLEMENT.

INTERSTATE DIVISION.

The settlers on this division were, as a rule, in comfortable circumstances considering the depressed agricultural and financial conditions. In general, the farmers on good land were doing well; those on the poorer portions that have as yet been little developed for irrigation were in unsatisfactory circumstances, financially and otherwise.

The extension of 40 miles of beet spurs into the farming territory and the completion of the Great Western sugar factory at Mitchell have been large factors in the development of the valley. The factory was completed in time to handle the 1920 season's crop and on the basis of capacity made the best operating record of the four factories in the valley. A fifth factory was started at Minatare, Nebr., but construction was suspended on account of the financial situation and low sugar prices.

On account of the stringent financial condition there was less improvement and development work in progress during the past season than for several years previous. Approximately 50 farms changed hands during the year, in comparison with 300 the year before. The average price paid was about $158 per acre. In spite of the adverse situation, the farmers were in a hopeful frame of mind and were looking forward to more settled conditions within the next year.

Settlement data, Interstate Division, North Platte project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	1,467	1,406	1,406	1,420	1,410
Population	4,200	4,500	4,500	4,500	5,000
Number of irrigated farms	1,189	1,274	1,274	1,310	[1] 1,300
Operated by owners or managers	721	810	774	860	[1] 800
Operated by tenants	468	464	500	450	[1] 500
Population	3,942	4,056	4,200	4,056	[1] 4,746
Number of towns	7	7	8	8	9
Population	5,500	8,000	11,000	11,610	14,382
Total population in towns and on farms	9,700	12,500	15,500	16,110	19,382
Number of public schools	34	40	40	40	40
Number of churches	25	25	25	25	26
Number of banks	16	16	16	21	21
Total capital stock	$352,000	$352,000	$352,000	$462,000	$777,500
Amount of deposits	$1,800,000	$2,400,000	$2,600,000	$3,100,000	$7,371,100
Number of depositors	6,000	7,000	7,200	7,500	12,000

[1] Exclusive of North Platte Canal & Colonization Co. lands.

FORT LARAMIE DIVISION.

The opening of 80 farm units and the further extension of the distribution system brought 126 farms or 8,537 acres under irrigation during the season of 1920, as compared with 62 farms with an irrigated area of 6,258 acres in 1919. The increase in the number of farms does not seem large enough considering the number of farm units thrown open to entry, but this is explained by the fact that 39 of these farms had been leased to The Liberty Wheat Growers in 1919. Development of the division has been retarded by the scarcity of labor and extremely high prices of all materials. The settlers are optimistic, however, and it is believed that development conditions on the division will improve as general conditions return to normal.

PRINCIPAL CROPS.

INTERSTATE DIVISION.

The area cropped in 1920 was 95,200 acres, including the North Platte Canal & Colonization Co.'s lands. Of this amount 41 per cent was in alfalfa, 29 in cereals, 17 in sugar beets, 6 in potatoes, and the remaining 7 per cent in miscellaneous crops. The total value of the crops on the Interstate Division for the season of 1920 was $4,043,600, with an average value of $47.10 per acre, as compared with a total value of $3,916,735.10 and an average value of $45.71 per acre in 1919. The increased value per acre was most pronounced in potatoes and sugar beets. The crop yields per acre were a little above normal on this division.

FORT LARAMIE DIVISION.

The area cropped in 1920 was 8,490 acres. Of this amount about 15 per cent was in alfalfa, 71 in cereals, 9 in sugar beets, 3 in potatoes, and the remaining 2 per cent in miscellaneous crops. Below is given a comparison in value of crops for the past three years, for this division.

Year.	Number of farms.	Acres cropped.	Value.		
			Per acre.	Per farm.	Total.
1918	40	4,644	$9.53	$1,161.00	$46,440.00
1919	62	6,258	22.91	2,312.36	143,366.32
1920	126	8,490	30.00	2,009.33	253,180.00

Crop report, Interstate Division, North Platte project, Nebraska-Wyoming, 1920.

(Exclusive of N. P. C. & C. Co. lands.)

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	31,620	Ton	67,483	2.1	$10.00	$674,800	$21.34
Alfalfa seed	30	Bushel	30	1.0	15.00	450	15.00
Barley	3,922	...do	98,394	25.1	.55	54,115	13.80
Beans	86	...do	661	7.7	3.00	1,983	23.06
Cane	261	Ton	610	23.5	4.00	2,448	9.38
Clover seed (sweet)	91	Bushel	526	5.8	15.00	7,890	8.67
Corn	10,176	...do	191,671	18.8	.75	143,750	14.12
Corn fodder	31	Ton	73	2.4	4.00	292	9.42
Garden	330					25,463	77.40
Hay (other)	528	Ton	675	1.3	12.00	8,100	15.34
Millet seed	335	Bushel	3,235	9.7	1.00	3,235	9.66
Oats	7,708	...do	216,507	28.1	.60	129,904	16.85
Pasture:							
Alfalfa	1,243				15.00	18,645	15.00
Sweet clover	378				15.00	5,670	15.00
Potatoes	5,800	Bushel	852,733	147.0	.75	639,550	110.29
Rye	611	...do	5,151	8.4	1.00	5,150	8.43
Sugar beets and tops	16,558	Ton	173,494	10.5	12.50	2,168,637	130.97
Wheat	5,971	Bushel	96,453	16.2	1.50	144,680	24.23
Miscellaneous	151					8,838	58.53
Total cropped	85,830	Total and average				4,043,600	47.10

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:					
Young alfalfa—					
Seeded with nurse crop	6,168				
Seeded without nurse crop	1,089				
Wheat, fall seeding	490				
Rye, fall seeding	29	Total irrigable area farms reported	108,767	1,325	97
Less duplicated areas	6,687	Total irrigated area farms reported	86,910	1,325	79
		Under water-right applications	85,910	1,313	78
Total irrigated	86,910	Under rental contracts	1,000	12	1
		Total cropped area farms reported	85,830	1,325	77

Crop report, Fort Laramie Division, North Platte project, Wyoming, 1920.

Alfalfa hay	972	Ton	1,755	1.8	$10.00	$17,550	$18.06
Barley	43	Bushel	500	12	.55	275	6.40
Beans	4	...do	21	5	3.00	63	15.75
Beets (sugar) and tops	759	Ton	6,226	8.2	12.50	77,825	102.53
Cane	12	...do	20	2	4.00	80	6.67
Corn fodder	46	...do	48	1	4.00	192	4.17
Corn	1,656	Bushel	36,258	22	.75	27,195	16.42
Garden	13					1,575	121.15
Hay (other)	286	Ton	131	0.5	12.00	1,572	5.50
Oats	2,250	Bushel	83,664	37	.60	50,200	22.31
Pasture:							
Alfalfa	70	Acre			15.00	1,050	15.00
Sweet clover	9	...do			15.00	135	15.00
Potatoes	248	Bushel	28,405	115	.75	21,305	85.90
Wheat	2,050	...do	35,938	17	1.50	53,907	26.24
Miscellaneous	72					256	3.56
Total cropped	8,490	Total and average				253,180	30.00

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:					
Young alfalfa—					
Seeded with nurse crop	370				
Seeded without nurse crop	40				
Wheat, fall seeding	224				
Less duplicated areas	594	Total irrigated area farms reported	8,530	126	8
		Under rental contracts	8,530	126	8
Total irrigated acreage	8,530	Total cropped area farms reported	8,490	126	8

Crop report, North Platte Canal & Colonization Co. lands, North Platte project, Wyoming, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	4,434	Ton	9,087	2	$10.00	$90,870	$20.49
Barley	96	Bushel	3,137	33	.55	1,725	17.97
Beets, sugar	1,115	Ton	10,674	9.6	12.50	133,410	119.66
Cane	36	...do	75	2	4.00	300	8.33
Corn	1,480	Bushel	28,512	19	.75	21,380	14.45
Oats	870	...do	22,768	26	.60	13,660	15.68
Potatoes	972	...do	153,504	158	.75	115,130	118.44
Rye	102	...do	445	4	1.00	445	4.36
Wheat	265	...do	3,720	14	1.50	5,580	21.06
Total cropped	9,370	Total and average				382,500	40.80

		Areas.	Acres.	Farms.	Percent of project.
Alfalfa:					
Seeded with nurse crop	414				
Seeded without nurse crop	260				
Less duplicated areas	414				
Total irrigated	9,630	Total irrigated area farms reported	9,630	125	.....

NORTHPORT DIVISION.

The Northport Division has made arrangements whereby approximately 2,000 acres of land in the division can be irrigated during the 1920 season. Water has been purchased under the provisions of the Warren Act to be delivered at the headgate of the Tri-State Canal of the Farmers' Irrigation District and is to be carried through that canal and a waste ditch at the end of the canal to the west boundary of the Northport Division, under contract between the two districts. The water will then be distributed by the United States through two of the new laterals in the Northport Division, the cost of such distribution to be paid monthly by the division.

SALE OF SUPPLEMENTAL STORAGE RIGHTS FROM PATHFINDER RESERVOIR TO PRIVATE LANDS.

The hydraulic studies mentioned in preceding annual reports are being continued by a competent hydrographer, and in cooperation with the State of Nebraska, for the purpose of determining losses in transmission and accessions from tributaries and obtaining such other information as will aid in a determination of water rights and proper water distribution.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, DECEMBER 21, 1920.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, and particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for certain lands of the North Platte project, Nebraska-Wyoming, is hereby given as follows:

2. **Lands for which water will be furnished.**—Upon proper water-right application being made therefor, water will be furnished under

said project in the irrigation season of 1921, and thereafter, for the irrigable lands described as follows:

T. 22 N., R. 52 W., 6th P. M.

Sec. 16—NE. ¼ NE. ¼, 16 acres.
NW. ¼ NE. ¼, 40 acres.
SW. ¼ NE. ¼, 40 acres.
SE. ¼ NE. ¼, 9 acres.
NE. ¼ NW. ¼, 39 acres.
NW. ¼ NW. ¼, 40 acres.
SW. ¼ NW. ¼, 40 acres.
SE. ¼ NW. ¼, 38 acres.
NE. ¼ SW. ¼, 29 acres.
NW. ¼ SW. ¼, 20 acres.
SW. ¼ SW. ¼, 37 acres.
SE. ¼ SW. ¼, 32 acres.
NE. ¼ SE. ¼, 17 acres.
NW. ¼ SE. ¼, 40 acres.
SW. ¼ SE. ¼, 40 acres.
SE. ¼ SE. ¼, 25 acres.

T. 23 N., R. 53 W., 6th P. M.

Sec. 18—Lot 4, 14 acres.

T. 22 N., R. 55 W., 6th P. M.

Sec. 3—Lot 3, 14 acres.
Lot 4, 9 acres.

T. 23 N., R. 56 W., 6th P. M.

Sec. 8—NE. ¼ SE. ¼, 11 acres.
SE. ¼ SE. ¼, 7 acres.
Sec. 17—NE. ¼ NE. ¼, 17 acres.
SE. ¼ NE. ¼, 23 acres.
NE. ¼ SE. ¼, 13 acres.
NW. ¼ SE. ¼, 29 acres.

T. 24 N., R. 56 W., 6th P. M.

Sec. 9—NE. ¼ NE. ¼, 3 acres.
SW. ¼ NE. ¼, 5 acres.
SE. ¼ NE. ¼, 20 acres.
NE. ¼ SW. ¼, 5 acres.
SE. ¼ SW. ¼, 11 acres.
Sec. 25—SW. ¼ NW. ¼, 16 acres.
Sec. 26—NE. ¼ NE. ¼, 16 acres.
SE. ¼ NE. ¼, 23 acres.

T. 23 N., R. 57 W., 6th P. M.

Sec. 8—NE. ¼ SE. ¼, 31 acres.
NW. ¼ SE. ¼, 3 acres.
SE. ¼ SE. ¼, 18 acres.
Sec. 9—NE. ¼ SE. ¼, 15 acres.
SW. ¼ SW. ¼, 4 acres.
Sec. 18—SW. ¼ NE. ¼, 29 acres.
SE. ¼ NE. ¼, 11 acres.

T. 23 N., R. 58 W., 6th P. M.

Sec. 1—NE. ¼ SW. ¼, 9 acres.
NE. ¼ SE. ¼, 6 acres.
NW. ¼ SE. ¼, 25 acres.

T. 25 N., R. 61 W., 6th P. M.

Sec. 35—NW. ¼ NE. ¼, 8 acres.
SW. ¼ NE. ¼, 34 acres.
NW. ¼ SE. ¼, 24 acres.

which lands are shown upon diagrams approved by the Secretary of the Interior on the date of this notice, said diagrams being amendatory of farm-unit plats previously approved by the Department of the Interior. Copies of the amendatory diagrams and farm-unit plats are on file at the office of the project manager, United States Reclamation Service, Mitchell, Nebr., and at the local land office, Alliance, Nebr.

3. **Limit of area for which water right may be secured.**—The maximum limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

4. **Applications for water right.**—All water-right applications must be made to the project manager, United States Reclamation Service, Mitchell, Nebr., upon forms provided for that purpose, and may be made on and after the date of this notice. No water will be furnished after the irrigation season of 1920 for any of said lands except under such application.

5. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (*a*) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (*b*) an annual charge against each irrigable acre to cover

cost of operation and maintenance of the system, termed the operation and maintenance charge.

6. **Construction charge.**—The construction charge shall be $75 per acre of irrigable land, payable as follows: An initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

7. **Increased construction charge in certain cases.**—In all cases where water-right application for lands in private ownership, or for lands under entries not subject to the reclamation act, shall not be made within one year from the date of this notice, the construction charge for such land shall be increased 5 per cent each year until such application is made and an initial installment is paid.

8. **Advance payment of construction charge permissible.**—Any water-right applicant may, at his option, pay in advance the whole or any part of the construction charge owing by him within any shorter period than that prescribed by this notice.

9. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1921, and thereafter until further notice, shall be of the same amount as for other land under the Interstate unit of the North Platte project. Such charge will be due and payable on March 1 of each year for the preceding irrigation season, but where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

10. **Place and manner of payment of water charges.**—All water-right charges must be paid at the office of the United States Reclamation Service, at Mitchell, Nebr., in cash, or by New York draft, or money order, payable to the special fiscal agent, United States Reclamation Service.

JOHN BARTON PAYNE,
Secretary of the Interior.

PUBLIC NOTICE, MARCH 3, 1921.

1. **Operation and maintenance charges for project lands under public notice.**—The annual operation and maintenance charges for the irrigation season of 1921 and thereafter until further notice against all lands of the North Platte irrigation project, Nebraska-Wyoming, under public notice, shall be as follows: The charge per acre-foot for water delivered during any part of the irrigation season will be $1.40. A minimum charge of $2.80 per irrigable acre will be made whether water is used or not. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season; but where entry of public land and water-right application therefor are made after June 15, or where water-right application is made after August 1, for land in

private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

2. **Water-rental charges for project lands not under public notice.**—For lands not under public notice and not covered by water-rental applications under departmental order of January 15, 1920, water will be furnished during the irrigation season of 1921 and thereafter until further notice, at a minimum charge of $1.70 per acre of irrigable land within each 40-acre subdivision for which it is desired to secure such water, under which charge the applicant will be entitled to not exceeding 2 acre-feet of water per acre for the season. Additional water will be furnished for $1 per acre-foot, limited, however, as to quantity and rate of delivery to the capacity of the system, as well as its profitable manner of operation, as determined by the chief engineer or his representative. However, lands not covered with a completed unit system built and operated by the United States, but which are covered with privately built irrigation systems, and for which unification contracts with the United States have been executed, will be furnished with water from the Fort Laramie Division system at a unit charge of 85 cents per acre-foot for water delivered to such lands or measured for such delivery in bulk at the nearest practicable delivery point. Such delivery will be made in such amounts and at such times as may be practicable and as shall conform to a reasonable manner of operation of the system. All of said water-rental charges are payable in advance.

3. **Water-rental charges for lands outside the project.**—Any stored water which may be released from Pathfinder Reservoir for lands outside the limits of the North Platte irrigation project will be furnished at a unit charge of 50 cents per acre-foot, measured at the diversion point of the receiving organization if such diversion point is within Wyoming, and at the Wyoming-Nebraska State line if the diversion point from the river is in Nebraska. Such supply will only be released upon formal application therefor and after the approval thereof by the Director of the United States Reclamation Service. Following such approval a contract must be executed and payment made for the amount covered by the application.

4. **Estimated cost of operation of Pathfinder Reservoir.**—In pursuance of contracts executed by the United States and certain private ditch organizations, for the sale of permanent storage rights in Pathfinder Reservoir, the terms of which contracts provide for the payment of a certain proportion of such amount as shall be fixed each year by the Secretary of the Interior as the total operation and maintenance charges in connection with the storage works, it is hereby announced that the estimated cost for the operation and maintenance of such storage works in the year 1921 is $8,000.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, North Platte project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$19,935.85
Inventory of materials and supplies on hand			123,075.63
Plant and equipment in use			635,302.47
Current accounts receivable			481,450.94
Construction charges not due			5,403,044.05
Unearned value of contracts			62,286.00
Construction cost of works		$11,150,625.78	
Operation and maintenance added to construction		82,413.95	
Operation and maintenance during construction		546,438.78	
Gross construction cost		11,779,478.51	
Less revenues and adjustments during construction period		111,908.78	
Net construction cost			11,667,569.73
Operation and maintenance cost under public notice		1,703,155.72	
Less operation and maintenance added to construction		82,413.95	
Gross operation and maintenance cost		1,620,741.77	
Less revenues and adjustments		1,392,342.24	
Deficit to Dec. 31, 1920	$65,175.98		
Net cost Jan. 1 to June 30, 1921	163,223.55		
			228,399.53
Investment items in transit			3,903.35
Total debits			18,624,967.55

CREDITS.

Current accounts payable		118,131.77
Contingent and deferred liabilities		82,083.48
Resources for repaying cost of project		7,026,825.88
Revenues held in reserve		117,987.36
Investment:		
Disbursements and transfers from other projects	$14,236,353.13	
Items in transit	3,903.35	
Total	14,240,256.48	
Less collections and transfers to other projects	2,960,317.42	
Net investment		11,279,939.06
Total credits		18,624,967.55

Construction cost and revenues, North Platte project.

INTERSTATE DIVISION.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and survey:		
Secondary projects and investigations		$61,165.14
Water-right adjudications		9,473.39
Subtotal		70,638.53
Storage system:		
Pathfinder Reservoir	$254,777.89	2,099,367.33
Lake Alice Reservoir		209,730.19
Lake Minatare Reservoir		560,876.41
Winters Creek Reservoir		7,436.69
Subtotal	254,777.89	2,877,410.62
Canal system:		
Whalen Diversion Dam		269,954.41
First Division Main Canal		1,044,508.84
Second Division Main Canal		854,270.17
Third Division Main Canal		447,194.84
Subtotal		2,615,928.26
Lateral system:		
Rawhide		3,819.31
District No. 1	1,477.41	361,744.04
District No. 2		287,026.97
District No. 3		296,954.44
Subtotal	1,477.41	949,544.76

Construction cost and revenues, North Platte project—Continued.

INTERSTATE DIVISION—Continued.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Drainage system:		
Investigations		$29,281.56
Open drains	$126,061.29	369,030.93
Closed drains	14,530.38	134,872.10
Subtotal	140,591.67	533,184.59
Irrigable area, farm units		43,003.29
Permanent improvements and lands:		
Buildings at Pathfinder		5,000.00
Buildings, First District		5,830.65
Buildings, Second District	4,539.81	47,028.19
Buildings, Third District	3,994.31	7,445.26
Experimental farm buildings		5,272.18
Subtotal	8,534.12	70,576.28
Operation and maintenance during construction		428,457.18
Accrued and unpaid operation and maintenance transferred to construction		82,413.95
Total cost of construction features	405,381.09	7,671,157.46

FORT LARAMIE DIVISION.

Examination and surveys:		
General surveys		$23,985.47
Water rights		6,350.00
Guernsey Storage Reservoir		2,554.24
Subtotal		32,889.71
Canal system:		
Surveys	$2,241.66	53,846.94
Whalen Dam and headworks		26,584.00
Tunnel No. 1		168,270.90
Tunnel No. 2		149,830.70
Earthwork in Wyoming	108,424.70	1,577,931.16
Earthwork in Nebraska	15,588.99	44,840.74
Concrete lining		15,085.52
Protecting canal banks		24,254.07
Roads and bridges	25,298.55	75,156.08
Canal right of way, including fencing	506.51	18,467.46
Priming		38,322.06
Sand traps	4,254.94	17,482.59
Siphons	12,076.21	120,679.35
Culverts		119,409.97
Wasteways	40,301.96	132,424.21
Turnouts	8,452.57	44,507.60
Checks	9,181.38	43,399.64
Minor structures		1,070.48
Subtotal	226,327.47	2,671,563.47
Lateral system:		
Surveys	350.07	115,319.12
Earthwork in Wyoming	49,636.28	279,027.68
Earthwork in Nebraska	9,172.64	46,634.80
Structures in Wyoming	111,914.55	268,510.97
Subtotal	171,073.54	709,492.57
Drainage system:		
Surveys	63.52	3,317.61
Open drains	64,238.19	117,085.62
Subtotal	64,301.71	120,403.23
Irrigable area (farm units)	4,980.38	15,008.45
Permanent improvements and lands		24,390.10
Telephone system		28,326.42
Operation and maintenance during construction	55,216.44	117,046.37
Total cost of construction features	521,899.54	3,719,120.32

Construction cost and revenues, North Platte project—Continued.

NORTHPORT DIVISION.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and surveys	.....	$4,183.30
Canal system:		
Surveys	$2,923.50	14,922.68
Earthwork	107,360.38	164,621.57
Bridges	2,296.17	10,802.77
Culverts	23,359.67	30,966.53
Siphons	51,022.94	51,022.94
Turnouts	2,549.12	4,265.72
Minor structures	507.60	507.60
Subtotal	190,019.18	277,109.81
Lateral system:		
Surveys	3,818.85	10,571.58
Earthwork	17,259.43	20,986.90
Structures	24,708.77	37,274.38
Subtotal	45,787.05	68,832.86
Drainage system:		
Surveys	618.17	618.17
Open drains	2,630.00	2,630.00
Subtotal	3,248.17	3,248.17
Permanent improvements and lands	4,890.39	34,891.36
Operation and maintenance during construction	725.47	935.23
Total cost of construction features	244,670.26	389,200.73

SUMMARY.

Total cost of construction features:		
Interstate Division	$405,381.09	$7,671,157.46
Northport Division	244,670.26	389,200.73
Fort Laramie Division	521,899.54	3,719,120.32
Gross cost of construction features	1,171,950.89	11,779,478.51
Less revenue earned during construction period:		
Rental of buildings	5,992.93	14,427.29
Rental of irrigation water	21,396.58	90,587.31
Freight refund	65.69	37,055.55
Miscellaneous revenue	1,006.22	4,889.65
Value of water furnished power plant	10,125.90	18,888.00
Doubtful accounts	22.94	22.94
Hospital operation	3,248.43	1,052.80
Power operation	1,731.49	1,736.44
Field cost adjustment	[1] 41,045.42	[1] 56,751.20
	2,544.76	111,908.78
Net construction cost to June 30, 1921	1,169,406.13	11,667,569.73

[1] Contra.

Operating cost and revenue, North Platte project, Interstate Division.

Features.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Storage works:						
Pathfinder Reservoir	$4,269.95	$1,303.68	$5,573.63	$42,328.97	$12,319.95	$54,648.92
Lake Alice Reservoir				4,012.74	1,453.43	5,466.17
Lake Minatare Reservoir		10,231.10	10,231.10	7,022.19	17,541.43	24,563.62
Gaging North Platte River	4,013.67		4,013.67	22,238.85		22,238.85
	8,283.62	11,534.78	19,818.40	75,602.75	31,314.81	106,917.56
Canal system:						
Whalen Diversion Dam	3,284.08		3,284.08	17,030.98	1,179.30	18,210.28
First Division Main Canal	9,039.00	48,051.91	57,090.91	95,328.93	274,214.24	369,543.17
Second Division Main Canal	11,405.25	15,669.60	27,074.85	62,979.89	99,551.12	162,531.01
	23,728.33	63,721.51	87,449.84	175,339.80	374,944.66	550,284.46
Lateral system:						
First and second lateral districts	22,166.68	99,468.45	121,635.13	182,925.73	347,696.65	530,622.38
Third lateral district	17,385.77	52,999.28	70,385.05	91,557.85	189,830.59	281,388.44
	39,552.45	152,467.73	192,020.18	274,483.58	537,527.24	812,010.82
Drainage system:						
Open drains		25,929.01	25,929.01		56,784.19	56,784.19
Closed drains		973.58	973.58		6,152.72	6,152.72
		26,902.59	26,902.59		62,936.91	62,936.91
Undistributed expenses: Crop reports				4,053.05		4,053.05
Subtotal	71,564.40	254,626.61	326,191.01	529,479.18	1,006,723.62	1,536,202.80
Less operation and maintenance added to construction						82,413.95
Total			326,191.01			1,453,788.85
REVENUES.						
Operation and maintenance repayments under contracts with water users:						
Charges due			301,513.79			1,381,129.92
Rentals of lands and buildings			[1] 1,750.70			
Interest and penalties			5,732.66			15,740.59
Discounts			[1] 12,635.83			[1] 27,369.25
Rentals of irrigation water			3,376.26			17,685.90
Other revenues unclassified			[1] 258.13			1,425.71
Total revenues			295,978.05			1,388,612.87
Difference, deficit			30,212.96			65,175.98

[1] Contra.

Costs by fiscal years, North Platte project.

Year ending June 30—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1905	$190,000.00			$190,000.00				$190,000.00
1906	1,195,591.61		$2,408.39	1,198,000.00				1,198,000.00
1907	1,242,513.82		8,486.18	1,251,000.00				1,251,000.00
1908	679,680.98		63,353.75	743,034.73				743,034.73
1909	550,226.76		173,660.95	723,887.71				723,887.71
1910	401,573.07		135,303.36	536,876.43				536,876.43
1911	495,704.37	$1,423.95	11,587.00	508,715.32	$101,394.61	$1,423.95	$99,970.66	608,685.98
1912	338,198.89	11,003.45	12,250.75	361,453.09	64,729.66	11,003.45	53,726.21	415,179.30
1913	373,052.00	16,042.31	16,250.00	405,344.31	66,853.40	16,042.31	50,811.09	456,155.40
1914	421,780.94	53,944.24	5,156.80	480,881.98	82,021.58	53,944.24	28,087.34	508,969.32
1915	446,895.69			446,895.69	86,021.92		86,021.92	532,917.61
1916	348,531.53			348,531.53	108,423.94		108,423.94	456,955.47
1917	855,548.91			855,548.91	115,514.49		115,514.49	971,063.40
1918	1,060,387.61			1,060,387.61	228,289.61		228,289.61	1,288,677.22
1919	908,208.52		29,594.06	937,802.58	235,303.00		235,303.00	1,173,105.58
1920	526,722.10		32,445.63	559,167.73	269,298.41		269,298.41	828,466.14
1921	1,116,008.98		55,941.91	1,171,950.89	345,295.10		345,295.10	1,517,245.99
Total	11,150,625.78	82,413.95	546,438.78	11,779,478.51	1,703,155.72	82,413.95	1,620,741.77	13,400,220.28

Costs by calendar years, North Platte project.

Year ending Dec. 31—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1904	$95,000.00			$95,000.00				$95,000.00
1905	692,795.80			692,795.80				692,795.80
1906	1,219,052.96			1,219,052.96				1,219,052.96
1907	961,096.48		$2,408.39	963,504.87				963,504.87
1908	614,953.87		8,486.18	623,440.05				623,440.05
1909	475,899.91		63,353.75	539,253.66				539,253.66
1910	448,638.71	$24.85	173,660.95	622,324.51	$50,697.30	$24.85	$50,672.45	672,996.96
1911	416,951.93	1,399.10	135,303.36	553,654.39	63,062.13	1,399.10	61,663.03	615,317.42
1912	355,625.45	11,003.45	11,587.00	378,215.90	65,791.53	11,003.45	54,788.08	433,003.98
1913	397,426.87	16,042.31	12,250.75	425,719.93	74,442.49	16,042.31	58,400.18	484,120.11
1914	434,328.31	53,944.24	16,250.00	504,522.55	84,026.75	53,944.24	30,082.51	534,605.06
1915	324,067.45		5,156.80	329,224.25	114,850.00		114,850.00	444,074.25
1916	644,736.59			644,736.59	119,693.74		119,693.74	764,430.33
1917	984,813.96			984,813.96	149,994.80		149,994.80	1,134,808.76
1918	1,190,548.25		16,930.15	1,207,478.40	235,176.56		235,176.56	1,442,654.96
1919	483,202.06		24,282.30	507,484.36	252,276.49		252,276.49	759,760.85
1920	776,777.64		52,016.08	828,793.72	326,191.01		326,191.01	1,154,984.73
Jan. 1 to June 30, 1921	634,709.54		24,753.07	659,462.61	166,952.92		166,952.92	826,415.53
Total	11,150,625.78	82,413.95	546,438.78	11,779,478.51	1,703,155.72	82,413.95	1,620,741.77	13,400,220.28

General expense, North Platte project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$14,216.50	$16,900.00	$31,116.50	$184,562.99	$45,470.00	$230,032.99
Project office	21,799.98	25,900.00	47,699.98	331,085.81	100,300.00	431,385.81
Denver office	6,927.71	8,300.00	15,227.71	102,794.95	32,830.00	135,624.95
District counsel's office	2,185.26	2,600.00	4,785.26	13,775.59	8,000.00	21,775.59
Other offices and miscellaneous				49,760.93	16,800.00	66,560.93
Total	45,129.45	53,700.00	98,829.45	681,980.27	203,400.00	885,380.27
Percentage of general expense to gross cost	4.1	13.3	6.5	6.1	9.1	6.6

NEVADA, NEWLANDS PROJECT.

JOHN F. RICHARDSON, project manager, Fallon, Nev.

LOCATION.

Counties: Churchill, Storey, and Lyon.

Townships: 17 and 18 N., Rs. 17 to 30 E.; 19 N., Rs. 26 to 31 E.; 20 N., Rs. 22 to 31 E.; Mount Diablo base and meridian.

Railroad: Southern Pacific.

Project cities and towns and estimated population, June 30, 1921; Derby, 20; Fernley, 150; Hazen, 100; Fallon, 2,500; Stillwater, 50.

WATER SUPPLY.

Source of water supply: Truckee and Carson Rivers.

Area of drainage basin: 3,450 square miles.

Annual run-off in acre-feet: Truckee River at Lake Tahoe outlet (519 square miles drainage), 1901 to 1920, maximum, 704,000; minimum, 113,000; mean, 264,277. Truckee River at Derby Dam (1,740 square miles drainage), 1900 to 1920, maximum, 1,435,000; minimum, 305,787; mean, 800,367. Carson River at Empire (988 square miles drainage), 1901 to 1920, maximum, 731,000; minimum, 144,217; mean, 371,536.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which Service was prepared to supply water, season 1921; 72,166 acres, area on farm unit plats June 30, 1921.

Area under water-right applications and rental contracts, season 1921: 69,800 acres.

Length of irrigation season: From April 1 to October 15, 198 days.

Average elevation of irrigable area: 4,000 feet above sea level.

Rainfall on irrigable area: Average, 4.58 inches.

Range of temperature on irrigable area: Mean maximum, 101.0° F.; mean minimum, −6.1° F.; average, 50.6° F. (15-year record).

Character of soil on irrigable area: Exceedingly variable; sand, sandy loam, adobe, clay, and volcanic ash.

Principal crops in order of importance: Alfalfa, small grain, sugar beets, potatoes, melons, garden truck, and dairy products.

Principal markets: Nevada and Pacific coast communities.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: May 6, November 1, 1907; January 30, April 4, June 5, December 26, 1908; March 1, September 28, 1909; April 26, September 16, 1910; April 22, October 17, 1911; February 8, June 13, 1912; January 17, June 23, July 15, July 21, 1913; August 19, December 16, 1914; January 30, February 26, March 20, May 13, November 12, 1915; January 17, February 11, 1916; March 10, March 22, July 16, July 31, October 30, 1917; January 2, January 15, April 3, April 10, May 7, May 20, July 9, August 14, October 1, December 3, 1918; April 23, May 31, August 2, August 18, November 10, 1919; January 26, March 12, April 5, June 10, October 19, 1920; February 25, April 20, 1921.

Location of lands opened: Ts. 17 to 20 N., Rs. 23 to 31 E., Mount Diablo base and meridian.

Limit of area of farm units: 40 to 160 acres.

Duty of water: About 3 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable lands: $22, $30, $60, $65, $80, and $115 (for Carson Lake leveled lands).

Annual operation and maintenance charge per acre of irrigable land: Fernley and Hazen benches, approximately $4.10 per acre; Fallon district, approximately $2.60 per acre, based on cost of service for 1921.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1902.
Construction recommended by director, March 7, 1903.
Construction conditionally authorized by Secretary, March 14, 1903.
Truckee River Diversion Dam and Truckee Canal completed June, 1905.
Carson River Diversion Dam and main distributing canals completed September, 1905.
First irrigation by Reclamation Service season of 1906.
Truckee Canal chute at Carson River completed November, 1910.
Lahontan power plant completed November, 1911.
Lahontan Dam commenced January, 1911.
Lahontan Dam completed June, 1915.
United States took possession of outlet works at Lake Tahoe and assumed control July 1, 1915.
Truckee-Carson irrigation district organized November 16, 1918.
Reconnoissance and preliminary survey for Spanish Springs Reservoir begun September 30, 1920, and completed January 7, 1921.
Entire project 49.8 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Newlands project provides for the storage of water in Lake Tahoe and Spanish Springs Reservoirs situated in the Truckee River basin and in Lahontan Reservoir in the Carson River basin; the diversion of water from Truckee River by a diversion dam about 20 miles below Reno, Nev., into the Truckee Canal, supplying water to lands in both the Truckee and Carson River valleys and to Lahontan Reservoir; the diversion of water from the Carson River by means of a diversion dam located about 5 miles below Lahontan Reservoir into the T and V Canal systems located on the north and south sides of the river, respectively, and watering lands in the lower Carson basin in the vicinity of Fallon, Nev. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: The control dam at outlet of Lake Tahoe, including the greater portion of the accessory dredging of the Truckee River channel; the diversion dam in Truckee River near Derby, Nev., and the Truckee Canal leading therefrom 31 miles to the terminal concrete chute discharging into Lahontan Reservoir on the Carson River; the forebay for the Lahontan hydroelectric power plant discharging Truckee Canal water into Carson River below Lahontan Dam; the Lahontan Dam and Reservoir on Carson River near Hazen, Nev.; the hydroelectric plant situated immediately below Lahontan Dam with pressure pipe connections to both the Truckee Canal and Lahontan Reservoir; the Carson Diversion Dam located about 5 miles below Lahontan Dam; the V and T Canals heading at Carson Diversion Dam and extending over the main portions of the Carson Sink Valley with Fallon as center; and that portion of the irrigation system which includes a vast network of laterals taking out of the Truckee Canal for the irrigation of lands in the vicinity of Fernley and Hazen and from the two main canals heading at Carson Dam which serve the major portion of the project.

The features remaining for future construction are: The Spanish Springs Reservoir in the lower Truckee River basin; the extension of the irrigation system to cover additional irrigable areas adjacent to and on all sides of the project as already constructed; and the extension of the drainage system which is proposed to be constructed under contract with the Truckee-Carson Irrigation District.

SUMMARY OF GENERAL DATA FOR NEWLANDS PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		187,000
Public land entered to June 30, 1921	29,279	
Public land open to entry on June 30, 1921	1,351	
Public land withdrawn on June 30, 1921	58,553	
Indian land June 30, 1921	23,877	
Railroad land unsold June 30, 1921	27,200	
Other private land June 30, 1921	46,740	
Acreage Service could have supplied in season of 1920		69,310
Estimated acreage service can supply in season 1921		72,166
Estimated acreage service can supply in season 1922		75,000
Acreage irrigated season of 1920		45,610
Acreage cropped under irrigation season of 1920		44,370

Crops:		
Value of irrigated crops season of 1920		$1,279,640.00
Value of irrigated crops per acre cropped		28.70
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$664,000.00	
Decrease under 10 per cent provision	[1] 45,600.00	
Miscellaneous collections and transfers issued	34,432.25	
Increase of compensation	16,656.76	
Total amount authorized		669,489.01
Encumbrances—		
Disbursements and transfers received	224,503.08	
Current liabilities	53,989.57	
Contingent liabilities	94,273.17	
Increase of compensation	16,657.05	
Total encumbrances		389,422.87
Unencumbered balance as of July 1, 1921		280,066.14
Fiscal year 1922—		
Amount specified in appropriation act		1,488,000.00
Fiscal year 1923—		
Proposed appropriation		915,000.00
Inventories:		
Value of stock on hand		55,927.10
Value of plant and equipment in use		115,056.92
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$6,508,470.52	
Less revenues and adjustments	8,904.04	
Net cost to June 30, 1921		6,499,566.48
Per cent completed on June 30, 1921	49.8	
Estimated per cent completed on June 30, 1922	50	
Estimated per cent completed on June 30, 1923	57	
Value of construction water-right contracts and other resources to repay net cost of project		2,122,645.39
Revenues held in reserve		28,727.42
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$767,083.23	
Less charges due and miscellaneous revenues	578,645.34	
Deficit		188,437.89
Drainage:		
Total cost of drainage works to June 30, 1921		119,977.29
Miles of drains built to June 30, 1921—		
Open	16.56	
Closed	3.99	
Total		20.55
Estimated acreage damaged by seepage on June 30, 1921		12,100
Estimated acreage protected by drains to June 30, 1921		15,940
Estimated acreage to be protected by authorized system		67,264

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges	$466,388.97	$450,750.00	.....	$5,436.50	$456,186.50	$10,202.47
Operation and maintenance charges (public notice)	564,905.74	505,018.56	$10,861.13	6,158.36	522,038.05	42,867.69
Rentals, irrigation water	14,668.17	14,431.67	.....	.....	14,431.67	236.50
Rentals, power	139,189.03	112,356.71	.....	25,487.75	137,844.46	1,344.57
Rentals, grazing and farming lands	23,678.79	23,630.39	.....	.....	23,630.39	48.40
Contractors' freight refunds	962.82	918.55	.....	.....	918.55	44.27
Miscellaneous	31,908.96	29,568.23	.....	.....	29,568.23	2,340.73
Total	1,241,702.48	1,136,674.11	10,861.13	37,082.61	1,184,617.85	57,084.63

[1] Contra.

CONSTRUCTION DURING FISCAL YEAR.

LATERAL CONSTRUCTION BY GOVERNMENT FORCES.

T System.

Name of lateral.	Length.	Earthwork.	Completed.
	Feet.	*Cubic yds.*	
UA_1	915	601	August, 1920.
Gault Lateral Wasteway	300	450	October, 1920.
R Lateral, station 0+00 to 100+65 (reconstruction)	10,065	3,000	February, 1921.
R4 Lateral, station 0+00 to 43+34 (reconstruction)	4,334	1,000	Do.
Smith	200	150	March, 1921.
Piersall	[1] 430	[1] 1,000	April, 1921.
Jemison	2,425	1,000	May, 1921.

[1] Includes reconstruction of about 150 feet of Q Lateral above Piersall Lateral heading.

V System.

Kennedy	570	446	March, 1921.
E5b Lateral, station 0+00 to 40+50 (reconstruction)	4,050	1,600	Do.
Buck	1,525	1,603	April, 1921.
Pierson Waste Water Ditch, station 0+00 to 7+00	700	300	May, 1921.

Lateral structures.—During the fiscal year 129 minor timber structures were installed by Government forces as follows:

Kind of structure.	T system.	V system.	Truckee system.
Bridges	.....	1	1
Checks	7	13	.....
Culverts	5	8	1
Drops	13	5	3
Flumes	1	1	.....
Turnouts, farm	30	30	3
Wasteways	3	2	.....
Miscellaneous structures	2	.....	.....
Total number	61	60	8

LATERAL CONSTRUCTION BY CONTRACT.

T System.

Gault Lateral.—Station 51+05 to 157+76.4: Schedule I, station 51+05 to 82+00, Paul R. Jackson, contractor; contract dated August 27, 1920; unit price bid, 16 cents per cubic yard; quantity of earthwork, 5,503 cubic yards; completed September 17, 1920.

Schedule II, station 82+00 to 120+50, D. H. Cashman, contractor; contract dated August 27, 1920; unit price bid, 16 cents per cubic yard; quantity of earthwork, 5,663.9 cubic yards; completed September 26, 1920.

Schedule III, station 120+50 to 157+76.4, John C. Bell, contractor; contract dated August 28, 1920; unit price bid, 15 cents per cubic yard; quantity of earthwork, 5,322.5 cubic yards; completed September 27, 1920.

Rabjohn Lateral.—Station 0+00 to 30+25.5: Schedule I, D. H. Cashman, contractor; contract dated November 3, 1920; unit price

bid, 14 cents per cubic yard; quantity of earthwork, 2,814.8 cubic yards; completed November 19, 1920.

Harding Lateral.—Station 27+86 to 59+80.3: Schedule I, Station 27+86 to 44+00, 1,881.3 cubic yards of earthwork, and schedule II, station 44+00 to 59+80.3, 1,783.4 cubic yards of earth work; Meister Bros., contractor for both schedules at a unit price bid of 7 cents per cubic yard; contract dated April 23, 1921; schedules I and II completed May 2 and May 9, 1921, respectively.

V System.

Hardy Lateral.—Schedule I, station 0+00 to 13+00: W. A. Paul, contractor; contract dated March 18, 1921; unit price bid, 17 cents per cubic yard; quantity of earthwork, 953 cubic yards; completed March 23, 1921. The construction cost of this lateral was paid for by water user benefited.

Thompson Lateral.—Schedule II, station 0+00 to 13+00; Homer V. Lattin, contractor; contract dated March 18, 1921; unit price bid, 15 cents per cubic yard; quantity of earthwork, 1,329 cubic yards; completed March 28, 1921.

Lattin Lateral.—Schedule III, station 0+00 to 10+00, Homer V. Lattin, contractor; contract dated March 18, 1921; unit price bid, 15 cents; quantity of earthwork, 566 cubic yards completed, March 31, 1921.

Wiggins Lateral.—Schedule IV, station 0+00 to 10+82: C. H. Hancock, contractor; contract dated March 18, 1921; unit price bid, 11 cents per cubic yard; quantity of earthwork, 921.3 cubic yards; completed March 31,1921.

J Lateral.—Station 26+00 to 40+00, schedule I: Lattin Bros., contractors; contract dated May 7, 1921; unit price bid, 14 cents per cubic yard; quantity of earthwork, 1,525.6 yards; completed May 25, 1921.

Pierson Waste Water Ditch.—Station 7+00 to 35+00, schedule II: A. Weishaupt and F. F. Kirn, contractors; contract dated May 7, 1921; unit price bid, 10 cents per cubic yard; quantity of earthwork, 1,453.3 cubic yards; completed May 11, 1921. Although advertised for construction to station 45+00 flooding of the lower end of the ditch made it impossible for the contractor to work below station 35+00.

Truckee System.

Lisle Lateral.—Schedule I, Station 0+00 to 26+00: J. A. Wood, contractor; contract dated June 16, 1921; unit price bid, 15 cents per cubic yard; quantity of earthwork, 1,895 cubic yards ; completed July 5, 1921.

All bids on schedule II, station 26+00 to 39+00 were rejected in favor of work being done by Government forces.

All of the earthwork done under contract consisted of dry class I material.

Truckee Canal Improvement.—No work was done under this feature after August, 1919, until on August 30, 1920, Monighan drag-line excavator No. 3 was started from Fallon, moving under its own power, to canal station 1400. From this point the weaker sections of the lower canal bank were cut down and rebuilt to station 1098, which point was reached on December 31, 1920. Owing to a serious

break which occurred in the Truckee Canal on January 2, 1921, at about station 1098, the excavating machine was used in repairing and improving the canal through the damaged section. It was necessary to excavate a new channel about 1,000 feet in length on the upper side of the canal around the break, involving the excavation of about 20,000 cubic yards of material. A silt blanket about 1,000 feet in length was placed along the inside slope of the lower canal bank adjacent to station 1098 to prevent seepage. This work was completed during April, 1921, following which no further improvements were made to this canal, as it was necessary to decrease operation and maintenance expenses.

Project shops and yards.—Work under this feature consisted of the erection of a small house as a shelter for the gasoline pump and motor, erection of a saw rig in the lumber yard for use in cutting out ditch structures, construction of a platform on one side of the oil house to facilitate the handling and loading of oil drums and painting of roofs of all buildings, and whitewashing of warehouse, coal house, harness shop, yard fence, and all corral fences.

The shops, yards, and storehouse were in operation during the entire year.

Tractor operations.—No land was leveled by Government forces. The five Holt tractors and other land-leveling equipment were idle. None of this equipment was rented for private work during the year.

Lake Tahoe outlet channel improvement.—Shortage of water for lands served by the Truckee Canal occasioned the sending of numerous telegrams to the Secretary of the Interior on July 14, 1920, from irrigation district officials, different organizations on the project, and from State Congressmen importuning for immediate relief by securing more water from Lake Tahoe.

On July 23, 1920, Col. E. Eveleth Winslow, Corps of Engineers, United States Army, acting under instructions from the Secretary of War, sent out a notice for all interested parties to the lake question to meet at Reno, Nev., on July 30 and discuss means for releasing sufficient water from Lake Tahoe for Newlands project farmers' needs. Director A. P. Davis, Project Manager John F. Richardson, State Engineer J. G. Scrugham, District Counsel E. W. Burr, Gov. Emmet D. Boyle, United States Senator Key Pittman, Attorney General U. S. Webb of California, Attorneys Green and Droste for California interests in Lake Tahoe, representatives of the Fernley and Swingle Bench districts, representatives of the Truckee River General Electric Co., and others attended the conference.

A planetable survey of the lake outlet was made by a party from the Fallon office from August 2 to August 4 under the personal direction of Col. Winslow.

On August 4 a telegram from the assistant director stated that the Secretary of the Interior had authorized cleaning the Truckee channel above the Tahoe Dam without interfering with the "rim" of the lake.

A conference was held from August 4 to 8 in San Francisco between Project Manager J. F. Richardson, District Counsel E. W. Burr, Attorney General U. S. Webb, representatives and attorneys for Lake Tahoe property owners, Nevada State officials, and others. On August 6 an agreement was made between the California and Nevada interests and the Reclamation Service whereby minor clean-

ing work was allowed to be done between the so-called "rim" of Lake Tahoe and the outlet gates, such work to be confined to hand methods.

In accordance with this agreement an outfit of seven men and two teams commenced work on August 11 in an attempt to secure a greater outflow from the lake. This work was supervised by a board of engineers consisting of Edward F. Haas, Col. J. G. Scrugham, and Project Manager John F. Richardson. Only minor work could be performed and little increase in outflow resulted. The work was discontinued on August 17.

To insure the delivery of the extra water obtained from cleaning the lake outlet to the Newlands project without diversion at intermediate points along the Truckee River, Special Assistant to the Attorney General R. G. Withers, in charge of the suit of the United States *v.* Orr Ditch Co. et al., for the adjudication of the Truckee River water rights, petitioned the Federal court for an order appointing a water master for this purpose. Such an order was issued by Federal District Judge E. S. Farrington on August 11, 1920, and State Engineer Col. J. G. Scrugham was appointed water master.

Heavy rains over the Truckee River watershed on August 24 increased the flow in the Truckee River and relieved the shortage conditions. The temporary water master was discharged on September 17 by court order.

Spanish Springs Valley Reservoir investigations.—In order to more definitely determine its feasibility as a storage site for Truckee River waters, investigations and surveys of the Spanish Springs Valley near Reno, Nev., were commenced on September 24, 1920, with the placing of two survey parties in the field.

Headquarters were established in Reno, Nev., with Engineer Ferd Bonstedt in charge.

Topography of a dam site and along proposed routes for feeder and outlet canals was taken. Borings and test pits were made at the dam site to determine the character of the foundations and search was made for suitable materials for dam construction at the Spanish Springs site.

Estimates for the various proposed features for construction and a report were prepared for use by a board of engineers which met in Reno on January 28, 1921. It was estimated that an earth dam 118 feet in height would provide a storage of 300,000 acre-feet at this site at an approximate total cost of $4,000,000 for the irrigation of about 67,000 acres in the Truckee, Pyramid, and Lovelock Branch Divisions and as supplementary to the Lahontan Reservoir for the irrigation of about 77,000 acres in the Carson Division.

During May, 1921, Dr. J. E. Diller, geologist, United States Geological Survey, made an exhaustive geological examination of the Spanish Springs Valley.

On February 9, 1921, a hearing was held in Washington before the Secretary of the Interior on the proposed power development by the Nevada Valleys Power Co. on the Truckee River below the proposed intake for the feed canal leading to Spanish Springs Reservoir. Such power development at that point would interfere with Spanish Springs storage plans. The chief engineer and representatives of the power company were in attendance. Hearings were later held at Denver and Reno.

King Basin Reservoir investigations.—Surveys and investigations were made under the direction of Engineer Ferd Bonstedt of a proposed storage site for Truckee River waters on Steamboat Creek about 6 miles southeast of Reno, Nev.

Topography of dam sites and feeder canals was taken and test borings were made at dam sites during December, 1920. Indications were that this site would not prove as favorable as the Spanish Springs site.

Truckee River water-right adjudication.—Work done during the fiscal year under this feature consisted of the preparation of evidence and hearing of testimony before Federal Judge E. S. Farrington at Reno, Nev., by Judge George A. Talbot as master in chancery. This is the suit of the United States of America *v.* Orr Ditch & Water Co. et al., to determine the respective rights of diversions from the Truckee River of all users and their priorities thereto.

During March, 1921, measurements were made by the United States with the cooperation of officials of the Truckee River General Electric Co. to determine the capacity of the Fleish, Verdi, Washoe, and Reno power plants on the Truckee River and of the power canals leading to those plants. Similar measurements were made at the Wadsworth power plant.

SEEPAGE AND DRAINAGE.

Recommendation was made and approved, based upon surveys made during July and August, 1920, granting temporary suspension of water-right charges on 1,394 acres of seeped and alkalied lands. This represented a net increase of 29 acres over the previous year. Only those lands upon which requests were made for the suspension of charges were affected.

No drainage-construction work was in progress during the year.

On September 29, 1920, the board of directors of the Truckee-Carson Irrigation District decided upon the uniform or flat rate plan for the assessment of drainage benefits subject to confirmation by the district court following properly instituted proceedings. On December 27, 1920, the officials of the irrigation district filed a petition with the district court for the confirmation of the board's plan for the assessment of drainage benefits.

On January 22, 1921, the contract between the United States and the Truckee-Carson Irrigation District was approved, providing for the expenditure of not to exceed $700,000 for the construction of deep open drains, this contract to become effective upon the confirmation of the organization of the irrigation district and the plan for the assessment of drainage benefits by the district court.

Hearings in confirmation proceedings were held before District Judge C. J. McFadden in Fallon, Nev., from February 1 to 11 and from March 7 to 30, 1921. On the latter date the court took the case under advisement, instructing the attorneys in the case to file briefs by way of further argument.

On June 25, 1921, Judge McFadden handed down an opinion in which he held that the irrigation district had been legally organized and that the assessment of drainage benefits as proposed by the board of directors was equitable and legal.

Opposition to the proposed drainage on the part of certain water users delayed the completion of plans and commencement of actual drainage construction.

ECONOMIES OF GOVERNMENT WORK.

An example of a saving effected by operations carried on by the Government during the past fiscal year was the storehouse maintained at Fallon, where a stock was carried of such supplies and materials as would ordinarily be required in the work being done, including lumber, forage for Government animals, gasoline and oils for motor vehicles, and drag lines, etc. During the fiscal year the value of the supplies issued from this stock amounted to $56,000 and the cost of operating the storehouse was $4,500, or approximately 8 per cent of the issues.

BOARD MEETINGS.

Date.	Topic.	Personnel.
Jan. 28, 1921	Additional water supply, Spanish Springs Reservoir.	Consulting Engineer D. C. Henny, Engineer James Munn, Project Manager John F. Richardson, Engineer Ferd Bonstedt.
Do	Extension Newlands project development, Spanish Springs Reservoir.	Do.
Mar. 5, 1921	Report on lands possible of irrigation from Truckee River and Spanish Springs Reservoir.	Edmund Dietz, W. H. Austin, W. A. Harmon, and C. E. Coe (committee of water users appointed by board of directors of Truckee-Carson Irrigation District at request of chief engineer).
Apr. 20, 1921	Compromise, Nevada Valleys Power Co., Newlands project.	Consulting Engineer D. C. Henny, Engineers J. M. Gaylord, E. B. Debler, John F. Richardson, Ferd Bonstedt, and District Counsel H. A. Cox.

OPERATION AND MAINTENANCE.

Storage works.—Lake Tahoe attained its peak elevation for the season of 6,226 feet on July 2, 1920. As the basis of United States storage in this lake is elevation 6,229 feet there was no accumulation of storage for project use in 1920 and the lake outflow was simply regulated to maintain the Truckee River General Electric Co.'s vested Floriston power rates. On August 10, 1920, in order to relieve to some extent a water shortage on project lands under the Truckee Canal, the Service, acting with the consent of the power company and property owners about the lake, opened wide all outlet gates in the control dam and removed a small amount of débris from the outlet channel above the dam, which increased the possible discharge for about 10 days to a maximum of 77 second-feet over the prevailing Floriston power rate (500 second-feet), besides aiding materially in keeping up the power draft for some time thereafter. Owing to the continued low-water condition the outlet gates were left wide open practically continuously after the above date until November 19, 1920, as the combined lake draft and natural flow of the Truckee River failed to maintain the aforesaid vested power rates. The elevation of Lake Tahoe on June 30, 1921, was 6,226.67 feet and the apparent maximum for the season 6,226.69 feet on July 3, 1921. Although this elevation will not, as in 1920, permit

accumulation of storage for the United States, the additional depth on lake and more favorable snowfall in the mountains during the past winter, which has materially increased the natural river run-off, will probably eliminate any serious water shortage for power or irrigation during 1921. The lowest elevation reached by Lake Tahoe during the past year was 6,224.37 feet on November 7, 1920. This elevation was the lowest recorded during the past 20 years.

Lahontan Reservior reached its maximum elevation for the season of 4,155.80 feet on April 15, 1920, with a storage of 217,700 acre-feet. At the close of the irrigation season there remained a surplus storage of 81,385 acre-feet in this reservoir. The total outflow during the irrigation season was 243,500 acre-feet and the maximum discharge through conduits 1,034 second-feet. The elevation of Lahontan Reservoir on June 30, 1921, was 4,161.20 feet, with a storage of 265,700 acre-feet. This elevation and storage was the apparent maximum for 1921 and the peak attained since the completion of the reservoir in 1915, the water surface being only 0.8 foot below the crest of spillways.

Carriage system.—The Truckee Canal was operated continuously throughout the year with the exception of about one week following January 2, 1921, when a serious break occurred in the lower embankment at a point about four miles west of Hazen, Nev. In 1920 this canal furnished water to 4,995 acres of land under the Truckee Lateral system besides transporting water for the operation of Lahontan power plant and delivery of 106,411 acre-feet into Lahontan Reservior for storage.

The T and V Canals, which head at the Carson Diversion Dam and divert storage waters released from Lahontan Reservoir and Truckee Canal water by-passed through the Lahontan power plant, were both operated only during the irrigation season. The T Canal furnished water to 3,400 acres of land under the North Carson Division during 1920, and the V Canal to 37,216 acres situated under the South Carson Division.

Water delivery.—The irrigation season of 1920 opened on March 17 and ended October 15, 212 days. During this period the canal and lateral system was operated almost continuously for the delivery of water to 742 farms containing an irrigated area of 45,610 acres. There was an abundant water supply for all project lands with the exception of about 5,000 acres located under the Truckee Canal, which are dependent upon the natural flow of Truckee River and such storage as the United States may be able to impound in Lake Tahoe under the present plan of regulation. The water shortage under these lands, which began about July 8, was due to the river falling off and the absence of any United States storage in Lake Tahoe. After the water shortage began the available water supply, which reached a minimum of 105 second-feet at the head of Truckee Canal, was very carefully rotated among the water users with the result that no crops were killed and the average yield of alfalfa, which is the predominating crop in that district, was only about 20 per cent below normal.

The delivery of water and general operation routine were carried on by the water master, assisted by 1 hydrographer, 3 gate tenders, and 13 ditch riders.

The following table shows the status of use of water on the Newlands project for years 1910 to 1920, inclusive:

Year.	Area irrigated.	Amount of water.				Duty of water.	
		Diverted.	Wasted.	Lost.	Distributed to farms.	Gross.	Net.
	Acres.	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Feet.*	*Feet.*
1910	27,562	177,577	12,570	36,758	128,249	6.00	4.65
1911	30,139	212,562	14,943	53,873	143,746	6.56	4.48
1912	36,620	164,063	1,496	82,656	86,611	4.48	2.50
1913	43,075	186,175	10,966	68,234	106,975	5.68	2.25
1914	39,615	268,028	49,568	80,356	138,104	6.77	3.28
1915	40,295	233,693	49,018	66,440	118,235	5.80	2.94
1916	39,449	264,186	54,429	78,964	130,793	6.69	3.32
1917	40,392	263,433	53,037	85,021	125,375	5.27	3.05
1918	42,311	266,927	38,918	101,464	126,545	6.31	2.99
1919	44,324	317,424	37,162	146,247	134,015	7.16	3.02
1920	45,610	295,225	36,251	129,162	129,814	5.68	2.85
Mean						6.03	3.21

Power plant.—The Lahontan power plant, which is under lease to the Canyon Power Co. until 1923, was operated with only two short interruptions during the past year. The first of these occurred in August, 1920, when the plant was shut down for about 10 days owing to water shortage under the Truckee Canal and to the water surface in Lahontan Reservoir falling below the auxiliary penstock; and the second for 4 days following the break in Truckee Canal on January 2, 1921. Owing to the water shortage under Truckee Canal during the 1920 irrigation season the power plant was switched over onto the auxiliary takeout from Lahontan Reservoir on June 25, from which source it was operated under full head until August 7, when the falling water surface in the reservoir forced a gradual shutdown until August 17, when at reservoir elevation 4,141.20 feet the plant was entirely closed down. The plant remained closed down until August 25, when surplus water was again available in the Truckee Canal as a result of heavy rains which greatly relieved irrigation demands for the remainder of the season.

Maintenance.—The ditch cleaning and other maintenance work was carried on under the personal supervision of the superintendent of irrigation assisted by 1 subforeman and an average crew of 35 men, using about 30 head of Government stock, augmented with private stock as required. About 85 miles of laterals were cleaned by team and fresno scrapers in the various districts in addition to enlarging about 5 miles of laterals in the Soda Lake district. Three Monighan and one small Austin drag-line excavators were used for cleaning and strengthening the banks of about 1 mile of main canal and 6 miles of laterals besides excavating 1.5 miles of deep drain and cleaning about 3.5 miles of deep and shallow drains. In addition to the regular ditch cleaning, trees and willows were also cut or pulled from the banks of some 25 miles of main canal and laterals. Some 5,000 square yards of brush riprap was placed on sandy sections of embankment along the S and V Canals. A log by-pass or spillway was built into the Carson Diversion Dam similar to the one constructed at the Derby Diversion Dam some years ago and which has proved very successful. Log booms were also constructed in connection with this

structure for the purpose of guiding logs and débris into the by-pass or spillway.

About 75 small redwood timber structures, such as farm turnouts, culverts, checks, etc., were installed as replacements of old decayed structures or additions to facilitate operation, besides one large redwood turnout in the Truckee Canal near the head of Kc Lateral which was made necessary in order to supplement the discharge of the old takeout for that lateral during low water in the Truckee Canal.

The problem of combating moss and other aquatic plant growths in the ditches during middle of summer proved as in other recent years one of the most serious tasks imposed upon the maintenance force. The same methods of eradication as employed in other years were used, namely, dragging ditches with heavy anchor chains and disk harrows and in very aggravated cases using hand scythes and submarine weed-cutting saws. During the irrigation season of 1920 several laterals in which moss was particularly aggravating were drained out for three or four days at a time at intervals of about one month with the result that about 75 per cent of the moss was killed each time, especially if the weather was clear and hot, thus saving the expensive operation of dragging or mowing.

Only the usual number of minor breaks occurred in the lateral system during the irrigation season. However, one major break occurred in the Truckee Canal on the morning of January 2, 1921, when the canal was diverting about 500 second-feet which was being used only for the operation of Lahontan power plant and to augment the storage in Lahontan Reservoir. This break was at the same place that the break of June, 1916, occurred. In order to do repair work it was necessary to keep water out of the canal until January 6, the Lahontan power plant being shut down in the meanwhile, as the water surface in Lahontan Reservoir was below the auxiliary power take out. By way of repairs, work was carried on day and night excavating a complete new channel about 1,000 feet in length on the upper side of the canal around the break, involving the excavation of approximately 20,000 cubic yards of material. In effecting repairs a cut-off trench was dug along the inside toe of the lower bank through this section of the canal and a puddle wall and clay blanket of impervious material placed which from all appearances makes this new portion of the canal quite as substantial and water-tight as the original.

A contract was let under date of March 3, 1921, and completed March 19, 1921, for earthwork in construction of the Dalton Lateral, V system, Stillwater District. This lateral, which is 2,538 feet in length and which involved the excavation of 6,456 cubic yards of earthwork, was constructed in order that an old lateral which has been very difficult and costly to operate and maintain might be abandoned.

The greater portion of the maintenance work scheduled for 1920 was completed by October 1, and practically all the heavy ditch cleaning involving the use of drag-line excavators contemplated in the 1921 ditch-cleaning campaign was completed by April 15, 1921.

Historical review, Newlands project, by calendar years.

Item.	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	70,915	70,915	71,817	65,809	69,310
Acreage irrigated	39,449	40,392	42,311	44,324	45,610
Miles of canal operated	305	355	356	365	389
Water diverted (acre-feet)	264,186	263,433	266,927	317,424	295,225
Water delivered to land (acre-feet)	130,793	125,375	126,545	134,015	129,814
Per acre of land irrigated (acre-feet)	3.32	3.05	2.99	3.02	2.85

SETTLEMENT.

During the past fiscal year 6 homesteads aggregating 438 acres of irrigable land were entered and 16 water-right applications, covering 1,334 acres of land in private ownership, were filed, making a total of 1,772 acres. No cancellations were recorded, hence the above figure indicates the net gain over the previous year.

During the past year 16 units of public land consisting of 1,076 acres of irrigable land were opened to entry and the farm-unit plats amended to include 19 tracts of private land containing 1,354 acres of irrigable land. Most of these lands, especially the private lands, were placed upon the farm-unit plats at the special request of individuals desiring to take up land, or take out water rights on private lands.

Numerous prospective settlers visited the project during the year and a great number of letters of inquiry in regard to land open to entry and general agricultural conditions on the project were received and answered. The increase in construction charge from $60 to $80 per acre which took place in 1920 has had the effect of slowing up settlement to a marked degree.

On June 30, 1921, there remained on the plats 14 farm units which had not been applied for. These units were scattered over the project to such an extent that prospective settlers find it difficult to find them in order to make an examination of their relative agricultural advantages.

Settlement data, Newlands project, by calendar years.

Item.	1916	1917	1918	1919	1920
Number of farms on project	584	600	610	675	785
Population	2,022	2,197	2,268	2,386	2,523
Number of irrigated farms	584	600	648	694	742
Operated by owners or managers	514	525	568	619	677
Operated by tenants	70	75	80	75	65
Population	2,022	2,197	2,268	2,386	2,523
Number of towns	5	5	5	5	5
Population	1,360	1,860	1,900	2,240	2,830
Total population, towns and on farms	3,382	4,057	4,168	4,626	5,353
Number of public schools	18	16	14	[1] 11	12
Number of churches	9	7	7	7	8
Number of banks	1	2	2	2	2
Capital stock	$100,000	$116,000	$116,000	$150,000	$115,900
Amount of deposits	$342,000	$371,240	$632,000	$790,000	$864,360
Number of depositors	700	775	1,214	1,860	2,500

[1] Fallon district schools consolidated in 1919.

WATER USERS' ACTIVITIES.

Numerous meetings were held during the year by the board of directors of the Truckee-Carson Irrigation District, mainly for the

consideration of matters relating to operation and maintenance or the construction of the proposed deep-drainage system. At an important meeting of the board held on September 29, 1920, a uniform or flat rate of $10.15 per acre was decided upon for assessment of drainage benefits under the proposed system. Meetings of the board were held daily from October 18 to 22, 1920, to hear protests of water users against the adopted plan for assessment of drainage benefits.

On January 26, 1921, a small faction of the project water users in opposition to the irrigation district organization and to the plans for assessment of drainage benefits started the circulation of petitions for the dissolution of the irrigation district. As a result of this movement a mass meeting was held by the Churchill County Commercial Club on January 29 for the discussion of these matters. Attorneys and others representing both the opposition and the irrigation district debated the subject with the result that the petitions were withdrawn.

On May 2, 1921, at a meeting of the board of directors of the irrigation district a resolution was passed indorsing the construction of the proposed Spanish Springs Reservoir.

During the past winter through the efforts of the agriculturist on demonstrations assigned to this project an Alfalfa Growers' Association was organized for the purpose of disposing of last season's alfalfa crop and to provide for a more dependable hay market in the future.

During the past year the Churchill County Commercial Club, which is located at Fallon, Nev., and which is composed largely of project water users, has been doing very commendable work in advertising the project and promoting the interests of the water users in general.

GENERAL AGRICULTURAL CONDITIONS.

The season of 1920 was the fifteenth consecutive year during which the Service has distributed water to all the farmers on the project.

The frostless growing season of 144 days in 1920, which extended from May 3 to September 24, was about normal for this section and permitted the harvesting of maximum yields of nearly all farm products.

No loss of any consequence was reported from grasshoppers or other insects; however, frequent hard winds visited the project during May to July, inclusive, which caused considerable damage to newly leveled land and young alfalfa seeding in the sandier districts, besides causing heavy maintenance expenses, due to ditches becoming filled with sand.

Alfalfa, which continues to be the predominating crop on this project, was grown on 26,540 acres in 1920, with a yield of 92,819 tons, as compared with 24,188 acres in 1919, which yielded 92,850 tons. The average yield in 1920 was 3.50 tons per acre, as compared with 3.84 tons per acre in 1919. This slight decrease in tonnage is attributed to the water shortage under the Truckee Division during the latter part of the season, which reduced the yield for that district by about 1 ton per acre. The price of alfalfa hay, which had ranged from $16 to $24 per ton during the war period, began to decline about the middle of the summer until by fall the price had fallen to about $10 per ton. Most of the farmers held their hay hoping for a better market, but to no avail, as the market remained at a particularly

stagnant condition all winter, and by spring the price had reduced to about $5 per ton in the stack. As alfalfa is the principal crop raised, the farmers on this project found themselves in a particularly bad condition financially in the spring of 1921 as a result of the unfavorable hay market.

Wheat, which ranks second to alfalfa in matter of acreage planted, was grown on only 3,586 acres in 1920, as compared with 5,973 acres in 1919. Although the average yield in 1920 was 25.53 bushels per acre, as compared with only 15.35 bushels in 1919, the low market price of wheat did not make it a profitable crop.

Potatoes were planted more extensively last season than in 1919, there being 354 acres reported in 1920, as compared with 152 acres the year previous. The average yield, however, was only 104 bushels per acre, as compared with 160 bushels in 1919. Most of the 1920 crop was marketed locally for about $1.20 per bushel.

Fruit, with the exception of apples and plums, was scarce in 1920, owing to the early opening of spring followed by a frost on May 3, which killed most of the tender varieties.

Garden truck was probably the most profitable crop grown on the project in 1920, owing to the late fall, which permitted harvesting maximum yields, and to the generally good market prices. Cantaloupes were an especially profitable crop, as there was always an eager market for these melons, and the price was favorable. The cantaloupe industry is being exploited to a considerable extent in 1921; approximately 200 acres were planted, and a cantaloupe association was organized among the growers to facilitate marketing.

Dairying on the project, which had been at a practical standstill for several years, was revived during the past winter as a result of the low market price for hay. During the spring about 400 high-grade milk cows were brought into the project by Mr. George Wingfield, of Reno, Nev., and sold to the farmers on a long-term payment plan in order to get the farmers to take over the Churchill Creamery (Inc.), located at Fallon, Nev., a Wingfield concern which has been used simply as a cream receiving station for the past two years for the Nevada Packing Co., of Reno, Nev., another of Mr. Wingfield's holdings. In taking over this creamery the farmers organized the Fallon Cooperative Creamery and started operation June 1, 1921. At the prevailing price of butter fat of 30 to 40 cents per pound at the close of the fiscal year the farmers reported a net return of about $20 per ton for their alfalfa hay by feeding it to good grade milk cows. The reclamation census taken at the close of 1920 reported 2,072 head of dairy cattle, as compared with 1,850 head in 1919.

Stock raising, while at a virtual standstill owing to scarcity of grazing land adjoining this project, has been greatly benefited by the Carson Lake pasture, which was created by the Service in 1918. This pasture, which embraces about 20,000 acres, was used for grazing a maximum of 2,100 head of cattle and horses in 1920. On June 30, 1921, the Government range rider reported 1,100 head of stock in the pasture. The grazing fee charged this year is the same as in 1920, namely, $6 per head for grown stuff and $3 per head for young for the season (May 1 to December 31), or $1 and 50 cents per month, respectively.

Crop report, Newlands project, Nevada, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	26,540	Ton	92,819	3.5	$10.00	$928,190	[1] $35.00
Barley	769	Bushel	22,500	29.26	.95	21,380	[1] 27.80
Garden and miscellaneous crops.	650					53,470	[1] 81.89
Oats	68	Bushel	3,375	49.63	.64	2,160	[1] 31.76
Potatoes	354	do	36,800	103.95	1.20	44,160	[1] 124.69
Wheat	3,586	do	91,533	25.53	1.50	137,300	[1] 38.29
Hay (grain)	505	Ton	751	1.49	14.00	10,510	20.82
Alfalfa (seeded 1920)	4,254	do	581		10.00	5,810	1.37
Pasture (wild grass)	9,720					28,340	2.91
Pasture (alfalfa after cutting)						48,320	
Less duplicated areas	1,876						
Total for acreage in full production.	31,970					1,186,658	[1] 37.11
		Total and average				1,279,640	28.70
Total cropped	44,570						
Irrigated without crop	1,040						
Total irrigated	45,610						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	69,310	742	36.10
Total irrigated area farms reported	45,610	742	23.75
Total cropped area farms reported	44,570	742	23.21

[1] Crops in full production.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, OCTOBER 19, 1920.

1. **Land for which water will be furnished.**—In pursuance of the provisions of section 4 of the act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, notice is hereby given that upon proper water-right application being made therefor, water will be furnished under the Newlands project, Nevada, in the irrigation season of 1920 and thereafter, for the irrigable areas of the following-described land, to wit:

PUBLIC LAND (UNENTERED).

T. 19 N., R. 28 E., M. D. M.:
Section 20, farm unit H (SW. ¼ NE. ¼, NW. ¼ SE. ¼).

PUBLIC LAND (TO AMEND FARM UNITS).

T. 18 N., R. 29 E., M. D. M.:
Section 10, amendment of farm unit L (NW. ¼ SW. ¼), by addition of SW. ¼ SW. ¼, forming farm unit Q (NW. ¼ SW. ¼, SW. ¼ SW. ¼).
T. 19 N., R. 28 E., M. D. M.:
Section 20, amendment of farm unit G (NW. ¼ NE. ¼) by addition of NE. ¼ NE. ¼, forming farm unit Q (NW. ¼ NE. ¼, NE. ¼ NE. ¼).

Diagrams, approved on the date of this notice, show the land above described, and are on file in the office of the project manager at Fallon, Nev., and in the local land office at Carson City, Nev.

2. **Limit of area for which water right may be secured.**—The limit of area of public land per entry, representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such land, is fixed at the amounts shown upon the plats for the several farm units.

3. **Water-right application.**—Each water-right application must be filed in the office of the project manager. Such application must be made in accordance with the conditions hereinafter stated, except that homestead entry for the additional areas of public land amendatory of farm units heretofore entered, which are described above under the heading "Public land (to amend farm units)," may be made on and after the date of this notice by the holder of the unit to be amended.

4. **Entry for public land.**—Subject to the provisions hereof and particularly to the soldiers' preference right referred to in paragraphs 17 and 18, homestead entry may be made at said local land office for the farm unit of unentered public land shown on said plats on and after 9 o'clock a. m., October 29, 1920, by a person holding approved water-right application. Every person desiring to acquire said public land must execute a water-right application upon a form provided for that purpose and accompany the same by payment of the water-right charge as hereinafter provided. Each water-right application must be for said farm unit, and more than one person may make such application, but not more than one water-right application can be made by the same person. Such water-right application must be filed with project manager, United States Reclamation Service, Fallon, Nev., in person, by mail, or otherwise, within a period of six days beginning October 23, 1920, and extending to and including 9 o'clock a. m., October 29, 1920. Water-right applications received after said period of six days will be filed and noted in the order of their receipt.

5. **Simultaneous filing of water-right applications.**—Water-right applications made and filed with the project manager during said six-day period will be held and treated as simultaneously filed, and the project manager will dispose of them as follows:

(*a*) Where there is no conflict the water-right application will be approved by the project manager.

(*b*) Where there are two or more water-right applications for the farm unit the project manager will write on cards the names of the several water-right applicants, and each of those cards containing the name of one such applicant will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., October 29, 1920, after all the envelopes containing the names of the several water-right applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the water-right applications of the respective persons, and the water-right applications will be approved in such order by the project manager.

6. **Approved water-right applications.**—Approval by the project manager of a water-right application for public land will entitle the water-right applicant to file homestead application at said local land office for the farm unit described in his water-right application. Such homestead application should be made within four days from date of approval of water-right application. Failure to so make such homestead application will entitle the water-right applicant next in order for the unit to have his water-right application approved by the project manager allowing him to make homestead application, this procedure continuing, if necessary, as to all appli-

cants. No part of a payment will be returned to a successful applicant in any case if he be a qualified homestead entryman.

7. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain public land applied for by him he will be permitted to withdraw his original application without prejudice. In the event of such withdrawal the water-right charges deposited will be returned by the project manager upon surrender of the receipt therefor.

8. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of said public land, begun without having at the time a valid approved water-right application covering the land in question: *Provided, however,* That this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

9. **Classes of charges for water right.**—The water-right charges against all of said land are of two kinds, to wit: (*a*) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge, and (*b*) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

10. **Construction charge.**—The construction charge for said land shall be $80 per irrigable acre. An initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall each be 5 per cent, and the remainder each 7 per cent, of the total construction charge. The first of the said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

11. **Advance payment of construction charge permissible.**—Any water-right applicant or entryman may, if he so elects, pay the whole or any part of the construction charge owing by him within any shorter period than that provided by the public notices and orders applicable to his land.

12. **Drainage costs.**—The construction charge announced by this notice includes none of the cost of any drainage system that may hereafter be constructed for the Newlands project.

13. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1921 and thereafter until further notice shall be of the same amount as for other like land under the said project. Such charge will be due and payable on March 1 of each year for the preceding irrigating season; but where water-right application is made for public land entered under the reclamation law after June 15, no operation and maintenance charge will be made for water delivered during the remainder of the irrigating season in which the water-right application is made.

14. **Place and manner of payment of water charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Fallon, Nev., in cash or by New York draft, or money order payable to the special fiscal agent, United States Reclamation Service.

15. **All land to be included in irrigation district.**—The water-right applications for all land covered by this public notice not now within

the Truckee-Carson Irrigation District, and which may be now or hereafter lawfully brought thereunder, shall contain the following provision.

The applicant agrees for himself and his successors to take appropriate steps in conformity with the laws of the State of Nevada, to have the land above described included within the Truckee-Carson Irrigation District. If for 30 days after notice is given him or successors by the project manager of the Newlands project to take any of such steps he or his successor fails so to do, this water-right application may, at the option of the Secretary of the Interior, be canceled, with the forfeiture of all rights acquired thereunder and of all payments made thereon.

16. **Reservation of rights of way for county highways.**—Rights of way are reserved for county highways across the farm units of public land above described along all north-and-south section lines and quarter-section lines, one-half mile apart, and upon all east-and-west section lines, 1 mile apart, said rights of way for road purposes being 30 feet in width on each side of such lines.

17. **Preference rights to soldiers.**—Until December 29, 1920, water-right applications and applications to make homestead entry hereunder, for lands described above under the heading "Public lands (unentered)," shall be received only from officers, soldiers, sailors, or marines who have served in the Army or Navy of the United States in the war with Germany and have been honorably separated or discharged therefrom or placed in the Regular Army or Naval Reserve: *Provided, however,* That they must be qualified to make entry under the homestead laws.

18. **Proof to be furnished by soldiers.**—Every person qualified under terms of the preceding paragraph who desires to make entry must file with his water-right application his affidavit, which shall state his time of service, the unit of which he was a member, the date on which he was honorably discharged or separated or transferred to the Regular Army or Naval Reserve, and that he did not refuse to wear the uniform of such service nor to perform the duties thereof. There shall be attached to said affidavit a copy of such honorable discharge or separation from the service, or the order of transfer to the Regular Army or Naval Reserve, as the case may be, which copy shall be certified by a notary public to be a true copy of the original.

19. **General entry.**—On and after December 29, 1920, the lands described herein as "Public lands (unentered)," if the same remain unentered, shall be subject to entry under this notice by any person having the general qualifications of a homestead entryman. If on December 29, 1920, prior to 2 p. m., more than one water-right application shall be filed for this farm unit, then the right to make entry for such unit shall be determined at 2 p. m. of that day in accordance with the provisions of paragraph 5 of this notice.

ALEXANDER T. VOGELSANG,
Acting Secretary of the Interior.

PUBLIC NOTICE, FEBRUARY 25, 1921.

Annual operation and maintenance charges.—In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1921

and thereafter until further notice against all lands of the Newlands irrigation project, Nevada, under public notice, shall be as follows:

(*a*) A minimum charge of $1.65 per irrigable acre will be made whether water is used thereon or not, which charge will permit the delivery of not to exceed 3 acre-feet of water per irrigable acre upon lands of the Fernley and Hazen benches shown upon a map on file in the project office, and not to exceed 1½ acre-feet per irrigable acre upon other lands of the project; and a charge of 80 cents per acre-foot per irrigable acre will be made for all additional water. These rates do not apply, however, to vested-right lands referred to in subdivision (*b*) following.

(*b*) A charge of $1.50 per acre-foot per irrigable acre will be made for any water in addition to 3 acre-feet per irrigable acre furnished to vested-right land, for which the contract adjusting the vested acreage provides that the United States is to deliver not to exceed 3 acre-feet per irrigable acre at a fixed charge of 40 cents per acre.

All operation and maintenance charges are due and payable on March 1 of each year for the preceding irrigation season, but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

The foregoing charges do not cover the water service through the stock-water supply pipes in the Fernley District, the charges for which service will be separately announced.

JOHN BARTON PAYNE,
Secretary of the Interior.

PUBLIC NOTICE APRIL 20, 1921.

1. **Land for which water will be furnished.**—In pursuance of the provisions of section 4 of the act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, notice is hereby given that upon proper water-right application being made therefor, water will be furnished under the First Division, Part Three, of the Newlands project, Nevada, in the irrigation season of 1921 and thereafter, for the irrigable areas of the following-described land, to wit:

PUBLIC LAND (UNENTERED.)

T. 19 N., R. 27 E., Mount Diablo meridian:
Sec. 12, farm unit K (N. ½ SW. ¼ and N. ½ SE. ¼).
Sec. 14, farm unit K (W. ½ NE. ¼ and S. ½ NW. ¼, except SW. ¼ SW. ¼ NW. ¼, which is reserved by the United States for a ditch-rider's station).
Sec. 14, farm unit L (NW. ¼ SW. ¼).
T. 18 N., R. 28 E., Mount Diablo meridian:
Sec. 7, farm unit A (NE. ¼).
Sec. 8, farm unit L (W. ½ NW. ¼ and SE. ¼ NW. ¼).
Sec. 21, farm unit G (SE. ¼).
T. 19 N., R. 28 E., Mount Diablo meridian:
Sec. 10, farm unit N (S. ½ SW. ¼).
Sec. 18, farm unit L (lot 3, NE. ¼ SW. ¼ and NW. ¼ SE. ¼).
Sec. 23, farm unit K (S. ½ SW. ¼ and SW. ¼ SE. ¼).
T .18 N., R. 29 E., Mount Diablo meridian:
Sec. 3, farm unit K (lot 2 and lot 3).
Sec. 35, farm unit G (SE. ¼ NW. ¼, except the SE. ¼ SE. ¼ SE. ¼ SE. ¼ NW. ¼, reserved for a community center).

T. 19 N., R. 29 E., Mount Diablo meridian:
Sec. 1, farm unit A (lot 3 and lot 4).
Sec. 3, farm unit A (SE. ¼ NE. ¼ and NE. ¼ SE. ¼).
Secs. 27 and 28, farm unit D (S. ½ NW. ¼ sec. 27 and S. ½ NE. ¼ sec. 28).
T. 18 N., R. 30 E., Mount Diablo meridian:
Sec. 31, farm unit A (E. ½ SW. ¼).

PUBLIC LAND (TO AMEND FARM UNITS).

T. 19 N., R. 27 E., Mount Diablo meridian:
Sec. 12, amendment of farm unit H (N. ½ NW. ¼) by addition of S. ½ NW. ¼, forming farm unit J (NW. ¼), increasing the irrigable area from 44 to 117 acres.
T. 19 N., R. 28 E., Mount Diablo meridian:
Sec. 6, amendment of farm unit H (lots 1 and 2) by addition of lots 3 and 4, forming farm unit N (lots 1, 2, 3, and 4), increasing the irrigable area from 73 to 89 acres.
Sec. 22, amendment of farm unit K (NE. ¼ SW. ¼) by addition of NE. ¼ SE. ¼ sec. 21, NW. ¼ SW. ¼, N. ½ SW. ¼, SW. ¼, W. ½ SW. ¼ SW. ¼ SW. ¼, W. ½ E. ½ SW. ¼ SW. ¼ SW. ¼, and N. ½ N. ½ SE. ¼ SW. ¼ SW. ¼, forming farm unit N, increasing the irrigable area from 30 to 31 acres.
T. 17 N., R. 28 E., Mount Diablo meridian:
Sec. 12, NW. ¼ NE. ¼.
T. 18 N., R. 28 E., Mount Diablo meridian:
Sec. 14, SW. ¼ SW. ¼.
Sec. 15, NE. ¼ SE. ¼, NW. ¼ SE. ¼, SW. ¼ SE. ¼, and SE. ¼ SE. ¼.
Sec. 22, NE. ¼ NE. ¼ and SE. ¼ NE. ¼.
Sec. 23, NE. ¼ NW. ¼, NW. ¼ NW. ¼, SW. ¼ NW. ¼, NE. ¼ SE. ¼, NW. ¼ SE. ¼, SW. ¼ SE. ¼, and SE. ¼ SE. ¼.
Sec. 24, NW. ¼ SE. ¼ and SW. ¼ SE. ¼ (amended to increase irrigable acreages) and SE. ¼ SE. ¼.
Sec. 25, NE. ¼ NE. ¼ and NW. ¼ NE. ¼ (amended to increase irrigable acreage).
T. 19 N., R. 28 E., Mount Diablo meridian:
Sec. 9, NE. ¼ NE. ¼, NW. ¼ NE. ¼, NE. ¼ SE. ¼, NW. ¼ SE. ¼, SW. ¼ SE. ¼, and SE. ¼ SE. ¼.
T. 20 N., R. 28 E., Mount Diablo meridian:
Sec. 29, NE. ¼ SW. ¼, NW. ¼ SW. ¼, SW. ¼ SW. ¼, and SE. ¼ SW. ¼.
T. 17 N., R. 29 E., Mount Diablo meridian:
Sec. 8, NE. ¼ NE. ¼, NW. ¼ NE. ¼, SW. ¼ NE. ¼, and SE. ¼ NE. ¼.
T. 18 N., R. 29 E., Mount Diablo meridian:
Sec. 2, SW. ¼ SW. ¼ and SE. ¼ SW. ¼.
Sec. 19, SE. ¼ SW. ¼ and lot 4 (amended to increase irrigable acreage).
Sec. 30, lot 1 (amended to increase irrigable acreage).
T. 19 N., R. 29 E., Mount Diablo meridian:
Sec. 5, SW. ¼ NE. ¼ and NW. ¼ SE. ¼.

Farm unit plats, approved on the date of this notice, show the land above described, and are on file in the office of the project manager at Fallon, Nev., and in the local land office at Carson City, Nev.

2. **Limit of area for which water right may be secured.**—The limit of area of public land per entry, representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such land, is fixed at the amounts shown upon the plats for the several farm units. The maximum limit of area for which water-right application may be made for land in private ownership shall be 160 acres of irrigable land for each landowner.

3. **Water-right application.**—Each water-right application must be filed in the office of the project manager. For land in private ownership such application may be made on and after the date of this notice; for public land such application must be made in accordance with the conditions hereinafter stated, except that home-

stead entry for the additional areas of public land amendatory of farm units heretofore entered, which are described above under the heading "Public land (to amend farm units)," may be made on and after the date of this notice.

4. **Entry for public land.**—Subject to the provisions hereof and particularly to the soldiers' preference right referred to in paragraphs 17 and 18, homestead entries may be made at said local land office for all farm units of unentered public land shown on said plats, on and after 9 o'clock a. m., May 13, 1921, by persons holding approved water-right applications. Every person desiring to acquire any of said public land must execute a water-right application upon a form provided for that purpose and accompany the same by payment of the water-right charge as hereinafter provided. Each water-right application must be for a specified farm unit, and more than one person may make such application for the same farm unit, but not more than one water-right application can be made by the same person. Such water-right application must be filed with project manager, United States Reclamation Service, Fallon, Nev., in person, by mail, or otherwise, within a period of six days beginning May 7, 1921, and extending to and including 9 o'clock a. m., May 13, 1921. Water-right applications received after said period of six days will be filed and noted in the order of their receipt.

5. **Simultaneous filing of water-right applications.**—Water-right applications made and filed with the project manager during said six-day period will be held and treated as simultaneously filed, and the project manager will dispose of them as follows:

(*a*) Where there is no conflict the water-right application will be approved by the project manager.

(*b*) Where there are two or more water-right applications for the farm unit the project manager will write on cards the names of the several water-right applicants, and each of those cards containing the name of one such applicant will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., May 13, 1921, after all the envelopes containing the names of the several water-right applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the water-right applications of the respective persons, and the water-right applications will be approved in such order by the project manager.

6. **Approved water-right applications.**—Approval by the project manager of a water-right application for public land will entitle the water-right applicant to file homestead application at said local land office for the farm unit described in his water-right application. Such homestead application should be made within four days from date of approval of water-right application. Failure to so make such homestead application will entitle the water-right applicant next in order for the same unit to have his water-right application approved by the project manager allowing him to make homestead application, this procedure continuing, if necessary, as to all applicants. No part of a payment will be returned to a successful applicant in any case if he be a qualified homestead entryman.

7. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain public land applied for by him he will be permitted to elect whether he will amend his application to embrace other land not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the water-right charges deposited will be returned by the project manager upon surrender of the receipt therefor.

8. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public land begun without having at the time a valid approved water-right application covering the land in question: *Provided, however,* That this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

9. **Classes of charges for water right.**—The water-right charges against all of said land are of two kinds, to wit: (*a*) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge, and (*b*) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

10. **Construction charge.**—The construction charge for said land shall be $80 per irrigable acre. An initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of the said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

11. **Advance payment of construction charge permissible.**—Any water-right applicant or entryman may, if he so elects, pay the whole or any part of the construction charge owing by him within any shorter period than that provided by the public notices and orders applicable to his land.

12. **Drainage costs.**—The construction charge announced by this notice includes none of the cost of any drainage system that may hereafter be constructed for the Newlands project.

13. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1921 and thereafter until further notice shall be of the same amount as for other like land under the said project. Such charge will be due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

14. **Place and manner of payment of water charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Fallon, Nev., in cash or by New York draft, or money order payable to the special fiscal agent, United States Reclamation Service.

15. **All land to be included in irrigation district.**—The water-right applications for all land covered by this public notice not now within the Truckee-Carson Irrigation District, and which may now or hereafter lawfully be brought thereunder, shall contain the following provision:

The applicant agrees for himself and his successors to take appropriate steps in conformity with the laws of the State of Nevada, to have the land above described included within the Truckee-Carson Irrigation District. If for 30 days after notice is given him or successors by the project manager of the Newlands project to take any of such steps he or his successors fails so to do, this water-right application may, at the option of the Secretary of the Interior, be canceled, with the forfeiture of all rights acquired thereunder and of all payments made thereon.

16. **Reservation of rights of way for county highways.**—Rights of way are reserved for county highways across the farm units of public land above described along all north-and-south section lines and quarter-section lines, one-half mile apart, and upon all east-and-west section lines, one mile apart, said rights of way for road purposes being 30 feet in width on each side of such lines.

17. **Preference rights to soldiers.**—Until July 13, 1921, water-right applications and applications to make homestead entry hereunder for lands described above under the heading "Public lands (unentered)," shall be received only from officers, soldiers, sailors, or marines who have served in the Army or Navy of the United States in the war with Germany and have been honorably separated or discharged therefrom or placed in the Regular Army or Naval Reserve: *Provided, however,* That they must be qualified to make entry under the homestead laws.

18. **Proof to be furnished by soldiers.**—Every person qualified under terms of the preceding paragraph who desires to make entry, must file with his water-right application his affidavit, which shall state his time of service, the unit of which he was a member, the date on which he was honorably discharged or separated or transferred to the Regular Army or Naval Reserve, and that he did not refuse to wear the uniform of such service nor to perform the duties thereof. There shall be attached to said affidavit a copy of such honorable discharge or separation from the service, or the order of transfer to the Regular Army or Naval Reserve, as the case may be, which copy shall be certified by a notary public to be a true copy of the original.

19. **General entry.**—On and after July 13, 1921, any public lands described herein which remain unentered, shall be subject to entry under this notice by any person having the general qualifications of a homestead entryman. If on July 13, 1921, prior to 2 p. m., more than one water-right application shall be filed for any farm unit, then the right to make entry for any such unit shall be determined at 2 p. m. of that day in accordance with the provisions of paragraph 5 of this notice.

E. C. Finney,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Newlands project, June 30, 1921.

DEBITS.

Collections on hand and in special deposits			$2,057.44
Inventory of materials and supplies on hand			55,927.10
Plant and equipment in use			115,056.92
Current accounts receivable			57,084.63
Construction charges not due			1,554,964.38
Unearned value of contracts			94,273.17
Construction cost of works		$6,506,447.59	
Operation and maintenance added to construction		2,022.93	
Gross construction cost		6,508,470.52	
Less revenues and adjustments during construction period		8,904.04	
Net construction cost			6,499,566.48
Operation and maintenance cost under public notice		$841,715.52	
Less operation and maintenance added to construction		2,022.93	
Gross operation and maintenance cost		839,692.59	
Less revenues and adjustments		575,443.65	
Deficit to Dec. 31, 1920	$188,437.89		
Net cost Jan. 1 to June 30, 1921	75,811.05		
			264,248.94
Investment items in transit			592.28
Total debits			8,643,771.34

CREDITS.

Current accounts payable		54,263.11
Contingent and deferred liabilities		96,330.61
Resources for repaying cost of project		2,122,645.39
Revenues held in reserve		28,727.42
Investment:		
Disbursements and transfers from other projects	$7,690,749.59	
Items in transit	592.28	
Total	7,691,341.87	
Less collections and transfers to other projects	1,349,537.06	
Net investment		6,341,804.81
Total credits		8,643,771.34

Construction cost and revenue, Newlands project.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and surveys:		
Pyramid Division	$1,601.01	$18,032.69
Truckee Division	2,401.54	22,720.62
Fallon Division	15,760.35	151,549.19
Lovelock Branch		11,648.79
Churchill Valley Division		18,788.27
Reno Valley		3,847.64
Upper Carson Valley		32,590.98
Truckee River water-right adjudication	11,247.65	63,264.61
	31,010.55	322,442.79
Storage system:		
Lahontan Reservoir	194.03	1,470,438.82
Lake Tahoe storage	3,682.65	213,552.49
	3,876.68	1,683,991.31
Canal system:		
Diversion Dam and Main Truckee Canal to Pyramid headworks		608,084.02
Main Truckee Canal, Pyramid headworks to Lahontan Dam	6,999.23	1,043,422.24
Carson Diversion Dam		93,578.52
V Line Canal		446,552.84
T Line Canal		82,909.62
	6,999.23	2,274,547.24
Lateral system:		
Truckee Canal laterals	994.54	118,950.72
Fernley stock water pipe line		26,276.05
V Line laterals	885.96	992,257.64
T Line laterals	14,613.26	169,748.65
System of waste-water ditches		249,976.41
	16,493.76	1,557,209.47

Construction cost and revenue, Newlands project—Continued.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Drainage system:		
Drainage investigations	$2,126.10	$38,379.59
Fernley Drain		24,328.27
Deep tile drains		31,397.75
V system drainage		25,871.68
	2,126.10	119,977.29
Flood protection: Carson River Channel		131,821.37
Power system:		
Commercial power system		26,346.65
Lahontan power house	[1] 25,487.75	138,511.52
	[1] 25,487.75	164,858.17
Farm units:		
Surveys and miscellaneous	3,342.63	33,384.37
Leveling farm lands under contract		23,829.92
Leveling farm lands under public notice		45,874.08
Settlement vested water rights	20.94	12,246.40
	3,363.57	115,334.77
Permanent improvements:		
Experimental farm		7,008.44
Headquarters and permanent buildings	[1] 4,507.53	48,220.14
Ditch riders' and gate tenders' houses	114.16	29,016.31
Lands purchased		9,008.85
Government stock pasture		320.99
	[1] 4,393.37	93,574.73
Telephone system		42,690.45
Operation and maintenance charges transferred to and compounded with construction charges		2,022.93
Gross cost to June 30, 1921	33,988.77	6,508,470.52
Less revenues earned during construction period:		
Rental of buildings	9,348.91	27,833.02
Contractors' freight refunds	51.65	962.82
Loss on hospital operations	587.76	[1] 1,065.10
Loss on farming operations	[1] 729.11	[1] 19,569.45
Gains on other operations, unclassified	341.21	742.75
Total revenues	9,600.42	8,904.04
Net construction cost, June 30, 1921	24,388.35	6,499,566.48

[1] Contra.

Operating cost and revenue, Newlands project.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Storage works	$3,794.88	[1] $110.72	$3,684.16	$20,641.35	$4,246.39	$24,887.74
Canal system	9,149.10	11,544.55	20,693.65	43,210.56	75,985.04	119,195.60
Lateral system	12,862.92	58,832.69	71,695.61	158,702.76	436,537.21	595,239.97
Drainage system		8,599.95	8,599.95	850.14	14,428.79	15,278.93
Flood protection					2,148.77	2,148.77
Permanent improvements		3,398.46	3,398.46		7,945.25	7,945.25
Miscellaneous expense					2,386.97	2,386.97
Total costs	25,806.90	82,264.93	108,071.83	223,404.81	543,678.42	767,083.23
Less unpaid operation and maintenance charges added to construction						2,022.93
Balance			108,071.83			765,060.30

Operating cost and revenue, Newlands project—Continued.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
REVENUES.						
Operation and maintenance repayment under contracts with water users:						
Charges due			$107,902.42			$564,989.94
Forfeitures			[1] 1,502.21			
Interest and penalties			673.06			4,908.03
Water rentals			2,688.37			13,846.67
Rentals of lands and buildings			[1] 5,103.27			
Other revenues, unclassified						1,089.21
Discounts (deduct)			[1] 2,677.43			[1] 8,211.44
Total revenues			101,980.94			576,622.41
Difference, deficit			6,090.89			188,437.89

[1] Contra.

Cost, by calendar years, Newlands project.

Year ending Dec. 31—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1902	$16,885.85		$16,885.85				$16,885.85
1903	87,978.97		87,978.97				87,978.97
1904	1,126,498.84		1,126,498.84				1,126,498.84
1905	1,469,956.95		1,469,956.95				1,469,956.95
1906	576,601.93		576,601.93	$27,637.68		$27,637.68	604,239.61
1907	386,071.04		386,071.04	30,684.89		30,684.89	416,755.93
1908	144,438.40		144,438.40	23,391.54		23,391.54	167,829.94
1909	78,633.50		78,633.50	33,391.31		33,391.31	112,024.81
1910	80,572.19		80,572.19	39,188.87		39,188.87	119,761.06
1911	362,488.25		362,488.25	38,535.21		38,535.21	401,023.46
1912	473,903.44		473,903.44	42,241.51		42,241.51	516,144.95
1913	435,548.32		435,548.32	48,746.82		48,746.82	484,295.14
1914	423,419.46		423,419.46	34,508.66		34,508.66	457,928.12
1915	202,226.41	$2,022.93	204,249.34	51,843.69	$2,022.93	49,820.76	254,070.10
1916	47,469.86		47,469.86	45,764.45		45,764.45	93,234.31
1917	124,303.60		124,303.60	67,629.61		67,629.61	191,933.21
1918	170,548.39		170,548.39	91,454.22		91,454.22	262,002.61
1919	150,202.78		150,202.78	83,992.94		83,992.94	234,195.72
1920	113,781.93		113,781.93	108,071.83		108,071.83	221,853.76
January to June 30, 1921	34,917.48		34,917.48	74,632.29		74,632.29	109,549.77
Total	6,506,447.59	2,022.93	6,508,470.52	841,715.52	2,022.93	839,692.59	7,348,163.11

Cost, by fiscal years, Newlands project.

Year ending June 30—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1903	$49,512.84	.....	$49,512.84	.....	.....	.....	$49,512.84
1904	478,128.80	.....	478,128.80	.....	.....	.....	478,128.80
1905	1,649,494.30	.....	1,649,494.30	.....	.....	.....	1,649,494.30
1906	774,506.37	.....	774,506.37	$21,003.34	.....	$21,003.34	795,509.71
1907	567,999.97	.....	567,999.97	27,488.73	.....	27,488.73	595,488.70
1908	244,768.85	.....	244,768.85	25,827.21	.....	25,827.21	270,596.06
1909	92,980.80	.....	92,980.80	26,052.57	.....	26,052.57	119,033.37
1910	69,945.22	.....	69,945.22	34,870.69	.....	34,870.69	104,815.91
1911	144,941.51	.....	144,941.51	38,653.04	.....	38,653.04	183,594.55
1912	479,711.83	.....	479,711.83	41,623.33	.....	41,623.33	521,335.16
1913	418,647.53	.....	418,647.53	48,180.67	.....	48,180.67	466,828.20
1914	482,523.67	.....	482,523.67	36,161.78	.....	36,161.78	518,685.45
1915	385,406.29	$2,022.93	387,429.22	49,073.46	$2,022.93	47,050.53	434,479.75
1916	50,103.71	.....	50,103.71	42,750.21	.....	42,750.21	92,853.92
1917	68,052.09	.....	68,052.09	52,786.03	.....	52,786.03	120,838.12
1918	176,013.45	.....	176,013.45	84,525.68	.....	84,525.68	260,539.13
1919	154,193.21	.....	154,193.21	104,626.61	.....	104,626.61	258,819.82
1920	148,445.77	.....	148,445.77	86,228.74	.....	86,228.74	234,674.51
1921	71,071.38	.....	[1] 71,071.38	121,863.43	.....	121,863.43	192,934.81
Total	6,506,447.59	2,022.93	6,508,470.52	841,715.52	2,022.93	839,692.59	7,348,163.11

[1] Differs by $37,082.61 from table of feature costs due to adjustments which have been shown above in appropriate years.

General expense, Newlands project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$1,806.78	$4,256.26	$6,063.04	$51,435.39	$32,307.09	$83,742.48
Project office	6,463.50	15,215.70	21,679.20	491,955.58	92,716.34	584,671.92
Denver office	827.24	1,948.84	2,776.08	9,280.13	12,095.31	21,375.44
District counsel's office	1,391.66	3,278.53	4,670.19	11,641.69	7,993.53	19,635.22
Other offices and miscellaneous	7.56	.....	7.56	56,683.27	.....	56,683.27
Total	10,496.74	24,699.33	35,196.07	620,996.06	145,112.27	766,108.33
Percentage of general expense to gross cost	14.7	20.2	18.2	9.5	17.2	10.4

NEW MEXICO, CARLSBAD PROJECT.

L. E. Foster, project manager, Carlsbad, N. Mex.

LOCATION.

County: Eddy.

Townships: 18 to 24 S., Rs. 25 to 29 E., New Mexico meridian.

Railroad: Atchison, Topeka & Santa Fe System.

Project cities and towns and estimated population, June 30, 1921: Carlsbad, 3,000; Otis, 50; Loving, 250; Malaga, 75.

WATER SUPPLY.

Source of water supply: Pecos River.

Area of drainage basin: 22,000 square miles.

Annual run-off in acre-feet of Pecos River at Carlsbad and Dayton (22,000 square miles), 1899 to 1920: Maximum, 912,000; minimum, 136,500; mean, 288,900 since 1905.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1921: 24,991 acres.

Area under water right applications, season of 1921: 24,859 acres.

Length of irrigating season: From March to November and two weeks in winter, 260 days.

Average elevation of irrigable area: 3,100 feet above sea level.

Rainfall on irrigable area: 1901–1920, average 14.38 inches; 1920, 14.74 inches.

Average of recorded temperatures for period of 18 years: Highest, 112° F.; lowest, −7° F.

Character of soil of irrigable area: Pecos sandy loam with large lime content.

Principal products: Alfalfa, cotton, grain crops, melons, peaches, pears, and miscellaneous fruits.

Principal markets: Carlsbad, N. Mex.; Denver, Colo.; Chicago, Ill.; Kansas City, Mo.; Texas cities; New Orleans, La.; New York, N. Y.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: December 17, 1907; November 30, 1908; June 2, November 17, 1909; October 7, 1910; March 13, 1911; February 17, 1912, March 2, April 10, 1915; February 24, September 2, 1916; March 9, 1917; March 12, 1918; March 11, June 24, 1919; February 20, 1920.

Location of lands opened: Ts. 21, 22, 23, and 24 S., Rs. 26, 27, 28, and 29 E., New Mexico meridian.

Duty of water: 2.42 acre-feet per acre per annum at the farm, 1920.

Building charge per acre of irrigable land: $31, $45, $55, $60, and $69.

Annual operation and maintenance charged on graduated scale according to use. For 1921, minimum charge of $2 per irrigable acre, whether water is used thereon or not, which charge will permit the delivery of not to exceed 2 acre-feet of water per irrigable acre; for the first acre-foot per irrigable acre additional, 50 cents per acre-foot; additional acre-feet, 75 cents per acre-foot. Waste water furnished from January 1 to March 10, 1921, at 15 cents per acre-foot. Terms of public notice dated February 20, 1920, were continued throughout 1921.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.

Construction recommended by board of engineers August 31, 1905.

Construction authorized by Secretary February 24, 1906.

Canal system of Pecos Irrigation Co. purchased February, 1906.

First irrigation by Reclamation Service, season 1907.

Construction completed at Avalon diversion, 1912.

Project 98.4 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Carlsbad project provides for the storage of water in Lake McMillan, on Pecos River, near Lakewood, N. Mex., and in a storage and distributing reservoir on the same river near Carlsbad, N. Mex., controlled by Avalon Dam; and the diversion of water from Avalon Reservoir into a canal system, watering lands on both sides of Pecos River, in the vicinity of Carlsbad. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The major construction features of the project were completed in 1912, the principal of which are: The Avalon Dam, which has a concrete core wall; McMillan, an earth and rock fill dam, which was built by private capital, antedating Government control; a concrete flume spanning the Pecos River, with 4 arches of 100 feet each; a reinforced concrete siphon, under Dark Canyon, 6 feet in diameter, originally 400 feet long, which was lengthened to 600 feet in 1916; about 50 miles of canals and laterals (exclusive of sublaterals and ditches); a concrete head-gate structure at each of the dams, and two spillway tunnels driven through rock, each 21 feet in diameter, lined with concrete, aggregating 200 feet in length, equipped with heavy cylindrical gates operated by turbines (replacing concrete spillway equipped with wooden emergency gates, spillway having been closed with concrete); and a reinforced concrete circular spillway 393 feet long. All check gates, spillways, and head-gate structures on the canals and all turnouts on the laterals are of concrete construction.

SUMMARY OF GENERAL DATA FOR CARLSBAD PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		24,991
Public land entered to June 30, 1921	55	
Other private land June 30, 1921	24,936	
Acreage Service could have supplied in season of 1920		24,991
Estimated acreage Service can supply in season of 1921		24,991
Estimated acreage Service can supply in season of 1922		24,991
Acreage irrigated season of 1920		22,170
Acreage cropped under irrigation season of 1920		20,180
Crops:		
Value of irrigated crops season of 1920		$963,800.00
Value of irrigated crops per acre cropped		47.75
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$108,000.00	
Miscellaneous collections and transfers issued	15,671.66	
Increase of compensation	6,218.90	
Total amount authorized		129,890.56
Encumbrances—		
Disbursements and transfers received	$89,437.82	
Current liabilities	7,106.02	
Contingent liabilities	1,201.80	
Increase of compensation	6,218.90	
Total encumbrances		103,964.54
Unencumbered balance as of July 1, 1921		25,926.02
Fiscal year 1922—		
Amount specified in appropriation act		100,000.00
Fiscal year 1923—		
Proposed appropriation		65,000.00
Inventories:		
Value of stock on hand		6,503.89
Value of plant and equipment in use		19,122.71
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$1,420,095.22	
Less revenues and adjustments	20,686.08	
Net cost to June 30, 1921		1,399,409.14
Per cent completed on June 30, 1921	98.4	
Estimated per cent completed on June 30, 1922	100	
Estimated per cent completed on June 30, 1923	100	
Value of construction water-right contracts and other resources to repay net cost of project		1,417,481.06
Revenues held in reserve		17,230.76
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$371,526.68	
Less charges due and miscellaneous revenues	350,331.07	
Deficit		21,195.61

Drainage:		
Total cost of drainage works to June 30, 1921		$129,705.87
Miles of drains built to June 30, 1921—		
Open	1$1.14	
Closed	3.65	
Total		14.79
Estimated acreage damaged by seepage on June 30, 1921		5,500
Estimated acreage protected by drains to June 30, 1921		5,031
Estimated acreage to be protected by authorized system		5,031

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Discount.	Total.	
Construction charges	$307,995.52	$272,175.37	.....	$272,175.37	$35,820.15
Operation and maintenance charges (public notice)	336,119.84	286,709.33	$4,356.24	291,065.57	45,054.27
Supplemental construction to be paid as operation and maintenance	965.00	772.00	.....	772.00	193.00
Rentals, irrigation water	17,384.74	17,384.74	.....	17,384.74	.....
Rentals, grazing and farming lands	8,752.45	8,532.49	.....	8,532.49	219.96
Contractors' freight refunds	208.29	205.36	.....	205.36	2.93
Miscellaneous	15,006.54	14,361.72	.....	14,361.72	644.82
Total	686,432.38	600,141.01	4,356.24	604,497.25	81,935.13

CONSTRUCTION DURING FISCAL YEAR.

Lateral system.—Construction work comprised the building of minor structures, including farm turnouts and weirs in the lateral system and the extension of sublaterals to accommodate Second and Third Division lands.

SEEPAGE AND DRAINAGE.

Drainage conditions were fairly good, except in several small areas variously located from Cass Draw south to Black River. A rising water table, which occurred after the rains began in early June, 1921, destroyed a small acreage of crops, and the total area of badly seeped land was increased by about 1,000 acres. By the end of the fiscal year, a number of requests had been made for postponement of water charges on a portion of the land. The Austin drag line was operated from February 1 to June 16, 1921, in cleaning silt from the lower reaches of open drains D and E and all of drain C. About 10,500 cubic yards of wet material were moved and 22,565 linear feet of drain cleaned with the machine. All open drains were cleaned of aquatic plants and salt cedars between the above dates.

OPERATION AND MAINTENANCE.

There was an abundant water supply during the growing season in 1920–21. The growing season was normal, with heavy rainfall in October, 1920, and during May and June, 1921. The rainfall for the fiscal year was 14.52 inches. The spring of 1921 was late and the planting season somewhat delayed, but this was largely offset by ideal growing conditions in the early summer. Maintenance work consisted of a general cleaning of the open drains and repair of the concrete section of the Main Canal. General repairs were made throughout the canal and lateral systems, and all steelwork

on the project was painted with coal-gas and water-gas tar. A force of about 20 men was employed cutting weeds and grass in the lateral system at the close of the fiscal year. The demand for water was not heavy after the planting season, owing to heavy showers in the early summer. There were no breaks in the canal during the year and only minor repairs were necessary on the east embankment at Lake McMillan.

Historical review, Carlsbad project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	24,796	24,775	24,775	24,775	24,991	24,991
Acreage irrigated	13,470	16,600	16,882	19,460	20,363	22,170
Miles of canal operated	45	45	45	45	45	45
Water diverted (acre-feet)	79,530	105,470	95,196	97,320	114,050	131,673
Water delivered to land (acre-feet)	28,857	40,382	39,589	47,380	48,933	53,644
Per acre of land irrigated (acre-feet)	2.14	2.43	2.33	2.43	2.4	2.42

SETTLEMENT.

Only a few new settlers purchased land during the fiscal year. Considerable building was in evidence throughout the project, indicating more permanent homes on the farms. Increase in the population in project towns was normal. Prices of farm lands had a downward trend after the first of the year, and few sales were reported.

Settlement data, Carlsbad project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Total number of farms on project	[1] 524	[1] 595	[1] 627	[1] 660	[1] 741	[1] 770
Population	912	634	992	1,257	1,378	1,575
Number of irrigated farms	325	455	535	458	565	363
Operated by owners or managers	[2] 149	[2] 167	[2] 190	[2] 231	[2] 298	[2] 189
Operated by tenants	176	83	243	227	267	267
Population	912	634	992	1,257	1,378	1,575
Number of towns	4	4	4	4	4	4
Population	3,000	3,300	3,300	3,375	3,375	3,375
Total population in towns and on farms	3,912	3,934	4,292	4,632	4,753	4,950
Number of public schools	7	7	7	7	7	13
Number of churches	8	8	8	8	8	11
Number of banks	2	3	3	3	3	5
Total capital stock	$80,000	$225,000	$275,000	$275,000	$275,000	$325,000
Amount of deposits	$687,000	$1,243,316	$1,271,266	$1,238,432	$1,271,645	$1,049,924
Number of depositors	1,484	2,138	1,941	2,234	2,611	2,617

[1] Water-right applications.
[2] Many farms were operated by one man.

PRINCIPAL CROPS.

Of the two principal crops grown alfalfa was the most profitable in 1920–21. The average price for the 1920 crop was $18.60 per ton. The crop of 1921, however, brought prices averaging about $9. More hay than usual was damaged by rains during the early summer of 1921, and the crop generally was barely paying current operating expenses. The cotton crop of 1920 was raised at a loss to the grower. Every item of expense which went into the making of the crop was at the highest level and the price obtained was about at the level of

prewar times. The financial condition which resulted seriously handicapped many farmers. The acreage planted to cotton in 1921 was about 9,000 acres. Good stands were obtained generally. A severe hailstorm in June destroyed about 1,200 acres of cotton. The crop generally was in excellent condition at the close of June.

Crop report, Carlsbad project, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	6,250	Ton	18,155	2.9	$18.61	$338,020	$54.08
Alfalfa seed	1,500	Bushel	6,507	4.33	6.66	43,340	28.89
Cane	64	Ton	100	1.54	12.86	1,286	20.00
Corn, Indian	82	Bushel	2,381	28.61	1.15	2,749	33.32
Corn fodder	16	Ton	14	.843	11.22	157	9.81
Cotton	13,150	Pound	3,366,500	256	.15	504,975	38.40
Cotton seed	13,150	Ton	3,370	.26	15.00	50,505	3.84
Garden	17	Acre				1,526	89.77
Oats	185	Bushel	8,870	48.18	1.02	9,070	49.33
Pasture	280					4,697	16.72
Wheat	136	Bushel	3,500	25.73	2.13	7,475	54.96
Less duplicated areas	14,650						
Total cropped	20,180	Total and average				963,800	47.75
Irrigated, but not cropped	1,990						
Total irrigated	22,170						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	24,990.6	363	100
Total irrigated area farms reported	22,170	363	89
Total cropped area farms reported	20,180	363	81

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, FEBRUARY 20, 1920.

Annual operation and maintenance charges.—In pursuance of section 4 of the national irrigation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1920 and thereafter until further notice against all lands of the Carlsbad project, New Mexico, under public notice, shall be a minimum charge of $2 per irrigable acre, whether water is used thereon or not, which charge will permit the delivery of not to exceed 2 acre-feet of water per irrigable acre; for the first acre-foot per irrigable acre additional the charge shall be 50 cents per acre-foot, and for further quantities 75 cents per acre-foot. An additional charge of 15 cents an acre-foot will be made for water used in the winter season beginning at the close of the irrigation season and ending March 10, which water would otherwise waste over the spillways at Lake Avalon. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season.

JOHN W. HALLOWELL,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Carlsbad project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$836.95
Inventory of materials and supplies on hand			6,503.99
Plant and equipment in use			19,122.71
Current accounts receivable			81,935.13
Construction charges not due			1,099,367.17
Unearned value of contracts			201.80
Construction cost of works		$1,418,161.22	
Operation and maintenance added to construction		1,934.00	
Gross construction cost		1,420,095.22	
Less revenues and adjustments during construction period		20,686.08	
Net construction cost			1,399,409.14
Operation and maintenance cost under public notice	$401,860.48		
Less operation and maintenance added to construction	1,934.00		
Gross operation and maintenance cost		399,926.48	
Less revenues and adjustments		349,652.34	
Deficit to Dec. 31, 1920	21,195.61		
Net cost Jan. 1 to June 30, 1921	29,078.53		
			50,274.14
Investment items in transit			701.38
Total debits			2,658,352.41

CREDITS.

Current accounts payable			$7,120.39
Contingent and deferred liabilities			1,038.75
Resources for repaying cost of project			1,417,481.06
Revenues held in reserve			17,230.76
Investment:			
Disbursements and transfers from other projects	$1,892,323.93		
Items in transit	791.38		
Total		$1,893,115.31	
Less collections and transfers to other projects	677,543.86		
Items in transit	90.00		
Total		677,633.86	
Net investment			1,215,481.45
Total credits			2,658,352.41

Construction cost and revenue, Carlsbad project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys: Preliminary surveys, etc		$41,081.56
Storage system:		
McMillan Reservoir—		
Preliminary surveys, etc		6,718.62
Rights of way and lands for flowage	$34,306.38	139,969.95
Dam, spillways, outlet works, headworks	[1] 2,242.77	225,567.39
Avalon Reservoir: Dam, spillways, outlet works		315,989.46
Third Reservoir: Preliminary surveys, etc		3,146.33
Total, storage system	32,063.61	691,391.75
Canal system:		
Main Canal (concrete lined, 12.18 miles)		187,828.96
East Canal		9,436.95
Black River Cut-off Canal		17,229.17
Black River Canal	[1] 249.75	33,576.54
Flumes		21,354.99
Dark Canyon Siphon		31,333.47
Wasteways, etc		29,621.29
Total, canal system	[1] 249.75	330,381.37
Lateral system:		
Laterals, excavation		32,550.72
Laterals, concrete lining		3,171.69
Minor structures, concrete		26,885.47
Minor structures, timber		1,457.43
Flume, near Avalon Dam		912.49
Siphon, near Avalon Dam		5,373.37
Total, lateral system		70,351.17

[1] Contra.

Construction cost and revenue, Carlsbad project—Continued.

Features.	Fiscal year 1921.	To June 30, 1921.
Drainage system:		
Preliminary surveys		$4,027.56
Open drains	[1] $1,248.96	82,512.85
Closed drains	[1] 1,649.10	43,165.46
Total, drainage system	[1] 2,898.06	129,705.87
Permanent improvements:		
Real estate (P. I. & I. Co. plant)		152,057.31
Buildings		3,192.19
Total, permanent improvements		155,249.50
Operation and maintenance charges transferred to and compounded with construction charges		1,934.00
Gross construction cost to June 30, 1921	28,915.80	1,420,095.22
Less revenues during construction period:		
Rentals of buildings	7,279.27	8,079.97
Rentals of grazing and farming lands	459.57	459.57
Rentals of irrigation water	1,313.70	9,477.05
Contractors' freight refunds		208.29
Other revenues, unclassified	190.82	3,059.36
Loss on hospital operations		[1] 598.16
Total, revenues	9,243.36	20,686.08
Net construction cost to June 30, 1921	19,672.44	1,399,409.14

[1] Contra.

Operating cost and revenue, Carlsbad project.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Storage works	$3,742.69	$4,427.37	$8,170.06	$24,642.85	$26,388.50	$51,031.35
Canal system	9,012.96	28,207.10	37,220.06	85,740.77	195,670.36	281,411.13
Lateral system		7,269.75	7,269.75		9,438.00	9,438.00
Drainage system		1,457.22	1,457.22		5,689.52	5,689.52
Permanent improvements		1,033.91	1,033.91		10,106.90	10,106.90
Farming operations					1,986.19	1,986.19
Miscellaneous expense		2,292.47	2,292.47		11,863.59	11,863.59
Total costs	12,755.65	44,687.82	57,443.47	110,383.62	261,143.06	371,526.68
Less unpaid operation maintenance charges added to construction						1,934.00
Balance						369,592.68
REVENUES.						
Operation and maintenance repayments under contracts with water users:						
Charges due			56,534.50			336,119.84
Payments advanced			10.91			10.91
Forfeitures			[1] 171.15			
Interest and penalties			550.76			6,016.05
Water rentals			120.00			6,533.09
Rentals of lands and buildings			[1] 5,880.05			
Other revenues, unclassified			199.93			3,374.78
Discounts			[1] 1,416.12			[1] 3,657.60
Total revenues			49,948.78			348,397.07
Difference, deficit			7,494.69			21,195.61

[1] Contra.

Cost by calendar years, Carlsbad project.

Year ending Dec. 31—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1902–1905	$24,713.44		$24,713.44				$24,713.44
1906	326,675.09		326,675.09				326,675.09
1907	192,504.28		192,504.28				192,504.28
1908	69,385.43		69,385.43	$16,631.26		$16,631.26	86,016.69
1909	36,475.86		36,475.86	21,884.66		21,884.66	58,360.52
1910	12,350.40		12,350.40	13,631.78		13,631.78	25,982.18
1911	40,030.90		40,030.90	17,607.26		17,607.26	57,638.16
1912	119,681.51		119,681.51	20,169.15		20,169.15	139,850.66
1913	39,589.28		39,589.28	23,387.88		23,387.88	62,977.16
1914	72,434.77		72,434.77	18,771.86		18,771.86	91,206.63
1915	87,218.49	$1,934.00	89,152.49	28,620.92	$1,934.00	26,686.92	115,839.41
1916	102,397.85		102,397.85	25,549.51		25,549.51	127,947.36
1917	144,081.91		144,081.91	29,239.58		29,239.58	173,321.49
1918	114,409.62		114,409.62	40,386.47		40,386.47	154,796.09
1919	[1] 827.70		[1] 827.70	58,202.88		58,202.88	57,375.18
1920	[1] 1,134.29		[1] 1,134.29	57,443.47		57,443.47	56,309.18
Jan. 1 to June 30, 1921	38,174.38		38,174.38	30,333.80		30,333.80	68,508.18
Total	1,418,161.22	1,934.00	1,420,095.22	401,860.48	1,934.00	399,926.48	1,820,021.70

[1] Contra.

Cost by fiscal years, Carlsbad project.

Year ending June 30—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1902–1905	$9,000.00		$9,000.00				$9,000.00
1906	241,000.00		241,000.00				241,000.00
1907	224,347.53		224,347.53				224,347.53
1908	103,888.41		103,888.41	$89,455.24		$89,455.24	113,343.65
1909	36,217.33		36,217.33	34,453.12		34,453.12	70,670.45
1910	34,324.23		34,324.23	9,697.78		9,697.78	44,022.01
1911	13,566.30		13,566.30	15,693.24		15,693.24	29,259.54
1912	144,542.06		144,542.06	6,899.71		6,899.71	151,441.77
1913	29,819.27		29,819.27	26,760.31		26,760.31	56,579.58
1914	57,094.49		57,094.49	23,662.81		23,662.81	80,757.30
1915	87,929.26	$1,934.00	89,863.26	25,668.57	$1,934.00	23,734.57	113,597.83
1916	81,538.97		81,538.97	22,283.25		22,283.25	103,822.22
1917	172,155.82		172,155.82	26,290.58		26,290.58	198,446.40
1918	144,113.27		144,113.27	35,027.67		35,027.67	179,140.94
1919	1,986.84		1,986.84	49,682.51		49,682.51	51,669.35
1920	7,721.64		7,721.64	60,559.24		60,559.24	68,280.88
1921	28,915.80		28,915.80	55,726.45		55,726.45	84,642.25
Total	1,418,161.22	1,934.00	1,420,095.22	401,860.48	1,934.00	399,926.48	1,820,021.70

General expense, Carlsbad project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$261.27	$1,977.71	$2,238.98	$19,984.74	$13,132.93	$33,117.67
Project office	1,774.65	13,429.77	15,204.42	86,266.08	75,620.29	161,886.37
Denver office	111.80	845.70	957.50	5,235.09	4,355.96	9,591.05
District counsel's office	245.44	1,858.46	2,103.90	6,596.02	7,305.61	13,901.63
Other offices and miscellaneous				1,152.68	5,083.92	6,236.60
Total	2,393.16	18,111.64	20,504.80	119,234.61	105,498.71	224,733.32
Percentage of general expense to gross cost	8.3	32.5	24.2	8.4	26.4	12.4

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

L. M. Lawson, project manager, El Paso, Tex.

LOCATION.

Counties, Socorro, Sierra, Dona Ana, N. Mex.; El Paso, Tex.

Townships: 8 to 29 S., Rs. 3 E. to 5 W., New Mexico meridian.

Railroads: Atchison, Topeka & Santa Fe; El Paso & Southwestern; Southern Pacific; and Texas & Pacific.

Project cities and towns and estimated population June 30, 1921: New Mexico—22; Las Cruces, 4,500; Mesilla Park, 850; Rincon, 400; Anthony, 350; La Mesa, 350; Mesilla, 300; San Miguel, 300; Dona Ana, 250; Fort Selden, 25; Leasburg, 25; Hill, 50; Mesquite, 50; Vado, 50; Berino, 50; Chamberino, 50; La Union, 50; Hatch, 60; Rodey, 100; Salem, 50; Garfield, 50; Derry, 50; Arrey, 30. Texas—14; El Paso, 80,000; Ysleta, 500; Clint, 500; Fabens, 500; San Elizario, 400; Canutillo, 300; Socorro, 100; San Jose, 150; Tornillo, 50; Isla, 50; Cuadrilla, 25; Belen, 20; Vinton, 25; Fort Bliss, 7,000.

WATER SUPPLY.

Source of water supply: Rio Grande; flood waters stored in Elephant Butte Reservoir. Area of drainage basin, 37,000 square miles. Annual run-off of Rio Grande, in acre-feet, at San Marcial (30,000 square miles) 1895 to 1920, inclusive: Maximum, 2,422,000; minimum, 201,000; mean, 1,193,251; year 1920, 2,241,632; at El Paso (38,600 square miles) 1889 to 1914, inclusive: Maximum, 2,010,000; minimum, 50,700; mean, 925,400. Data since 1914 at El Paso are not published, as most of the surplus water since that date has been stored in Elephant Butte Reservoir.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1921: 109,000 acres.

Area irrigated, season of 1920: 73,346 acres.[1]

Area under water-rental contracts, season of 1921: 75,000 acres.[1]

Length of irrigation season: From February 15 to October 15, 245 days, and winter irrigation of wheat.

Duty of water: 2 to 5 acre-feet; average, 3 acre-feet per acre delivered to farms.

Average elevation of irrigable area: 3,500 to 4,100 feet above sea level.

Rainfall on irrigable area, 35-year average: 10.03 inches; year 1920, 6.21 inches.

Range of temperature on irrigable area, extremes, 29-year record: Extreme low, −5° F.; extreme high, 105° F.; average low, 6° F.; average high, 102° F.

Average dates of killing frost: Last in spring, April 1; first in fall, November 1.

Character of soil of irrigable area: Fertile valley alluvium and sandy loam.

Principal products: Alfalfa, corn, wheat, melons, fruit, vegetables, and dairy products.

Principal markets: Local towns in New Mexico and Texas, eastern cities, Middle West stockyards, and New Mexico and Arizona mining towns.

LANDS OPENED FOR IRRIGATION.

There is no public land on the project open to entry. The only public land remaining on the project is in isolated fractional lots of value as adjacent entries only but still covered by withdrawals. Nearly all land was in private ownership at the beginning of project operations, most of it being held under land-grant titles.

Notices were served on the Elephant Butte Irrigation District and the El Paso County Water Improvement District No. 1 under date of December 11, 1920, for the payment of the first installment of construction charges in 1921 on 85,000 acres, 55,000 acres in the Mesilla Valley and 30,000 acres in the El Paso Valley. Because of the

[1] Land irrigated through Government operated distribution system only; does not include approximately 10,000 acres in Picacho, Island, and Tornillo still irrigating from community ditches diverting direct from the river.

financial stringency, however, the beginning of payments on construction charges has been deferred one year.

The opening construction charges have been announced at $90 per acre.

All land irrigated on the project in 1920 was served under water-rental contracts.

Operation and maintenance charges for land under the Government-operated system were $1.75 per acre, minimum charge for the first 2 acre-feet, $1 for the third acre-foot, and $1.25 for each acre-foot in excess of 3 acre-feet. In addition a reservoir charge of 50 cents per acre was assessed against each acre irrigated and credited to construction of Elephant Butte Dam. The Elephant Butte Irrigation District assessed a minimum operation and maintenance charge of 75 cents per acre against all irrigable land. Lands still operating under old community ditch systems or diverting water direct from the river were charged 50 cents per acre for stored water, which was credited to Elephant Butte Dam construction, and 75 cents per acre for operation and maintenance of the storage and delivery to these ditches.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in March, 1903.

Construction of Leasburg division authorized December 2, 1905.

Reclamation act extended to Texas June 12, 1906 (34 Stat., 259).

Treaty with Mexico providing for distribution of waters of the Rio Grande proclaimed January 16, 1907.

Construction of Elephant Butte Dam authorized by Congress and $1,000,000 appropriated March 4, 1907 (34 Stat., 1357).

Leasburg division completed July, 1908.

First irrigation by Reclamation Service (Leasburg division), season of 1908.

Construction of Elephant Butte Dam authorized by Secretary May 23, 1910.

Construction plans of Elephant Butte Dam approved by board of engineers June 6, 1910, January 22, 1911, August 12, 1912, January 30, 1913.

Construction plans approved by Secretary October 26, 1910.

Franklin Canal purchased October, 1912.

First 11 miles of Franklin Canal reconstructed March, 1914; second section (8 miles reconstructed 1915).

East Side Canal completed September, 1915.

West Side Canal completed November, 1915.

San Elizario feed canal completed April, 1916.

Elephant Butte Dam completed May 13, 1916.

Mesilla diversion dam completed May 31, 1916.

Leasburg extension canal and Picacho branch canal to station 121 completed May 31, 1916.

Percha Dam completed January, 1918.

Arrey Canal completed January, 1918.

Garfield Flume completed February, 1911.

Garfield Canal construction begun June, 1917.

Hatch Siphon construction begun January, 1918.

Hatch Canal construction begun February, 1918.

San Miguel Canal construction begun October, 1917.

Mesilla Valley, Nemexas drain begun August, 1917.

Mesilla Valley, west drain begun August, 1917.

Montoya headgate completed June, 1918.

Montoya Canal construction begun March, 1918.

Juan d'Herrera lateral district completed May, 1918.

San Elizario headgate completed May, 1918.

San Elizario main canal construction begun January, 1918.

El Paso Valley river and middle drains construction begun July, 1917.

Rincon Siphon begun August, 1918.

Hatch Siphon completed October, 1918.

Construction Rincon main canal begun October, 1918.

Hatch Canal completed March, 1919.

Community canals, Mesilla Valley, deeded to the Service for reconstruction and operation, December, 1918.

Rincon Siphon completed March, 1919.

Feeder canal for San Elizario Island completed March, 1919.

La Union Irrigation Co. property transferred to Reclamation Service April, 1920.

Construction Elephant Butte spillway channel and embankment paving begun October, 1920; embankment paving completed June 16, 1921.

West Side Canal extended to Montoya Siphon by reconstruction of portion of La Union system, 1920–21.

Montoya Siphon constructed January–February, 1921.

Chamberino Lateral heading reconstructed January–February, 1921.

Franklin Canal headworks enlarged and skimming weir installed, January-February, 1921.

Franklin Feeder Canal enlarged, May–June, 1921.

Salatral Lateral reconstructed, January–June, 1921.

Sixteen main drains completed and 212 miles of drain, or 60 per cent of the whole drainage system constructed to June 30, 1921.

Project, including Elephant Butte Dam, 74 per cent completed on June 30, 1921.

IRRIGATION PLAN.

Storage.—The primary feature in the irrigation plan for the Rio Grande project constitutes the storage of flood water of the Rio Grande in Elephant Butte Reservoir, having an original storage capacity of 2,638,860 acre-feet and a total length of 45 miles. This reservoir is formed by the construction of Elephant Butte Dam, a cyclopean concrete structure 1,585 feet long, not including the spillway, 306 feet high from the bedrock foundation to the parapet, containing 611,700 cubic yards of concrete masonry, and located 120 miles north of El Paso. In addition to the main structure it was necessary to construct an earth and rock fill embankment 2,000 feet long, containing 165,700 cubic yards, across a saddle 1 mile west of Elephant Butte Dam. The main structures of this feature were completed in June, 1916, at an approximate cost of $5,000,000, but the first stored water was held during the winter of 1914–15 and supplied to water users for irrigation during the season of 1915.

Diversion and main canals.—The diversion systems for the project consist of 4 concrete diversion dams, 2 headings without dams, 3 flumes, and 3 siphons across the Rio Grande, and 128 miles of main canal. Water for the irrigation of 1,700 acres in the Rincon Valley is diverted at Percha Dam, 30 miles below the reservoir, and carried down the valley through the Rincon Valley Canal consisting of the following canal divisions, river crossings: Arrey Canal, Garfield Flume, Garfield Canal, Hatch Siphon, Hatch Canal, Rincon Siphon, and Rincon Canal, a total length of 29 miles. The Mesilla Valley is divided into two divisions. Water for the Leasburg Division is diverted at the Leasburg Dam, at the head of the valley and 60 miles above El Paso, and is carried to the distribution system through the Leasburg Canal, 13.6 miles long. Water for the Mesilla Division is diverted at the Mesilla Dam, 40 miles above El Paso, and is carried from the point of diversion in two main canals, the East Side Canal 10.3 miles long, and the West Side Canal and extension 28.4 miles long. Water for the Montoya area in the extreme lower end of the valley is carried across the river from the West Side system through the Montoya Siphon. Water for the El Paso Valley is diverted by the Mexican Diversion Dam at El Paso, and is carried the full length of the El Paso Valley through the Franklin Canal, 31.4 miles long which is fed at an intermediate point by the Franklin Feeder Canal, 5.1 miles long, diverting at the Franklin Feeder heading without a weir, 14 miles below El Paso. Water for the irrigation of the Island area is carried from the Franklin Canal through the Island feeder Canal and the Island Flume over the Rio Grande. The last diversion on the project will be at the Tornillo heading located near Fabens, 30 miles below El Paso.

Nearly all of these features have been completed. The only items remaining for construction are the Picacho Flume, the extension of the Leasburg Canal for a distance of about 2 miles, and the construction of the Tornillo heading, and a section of main canal 4 miles long.

Laterals.—When the project construction began approximately 50 per cent of the area was in cultivation, the land receiving water through a large number of community-operated ditch systems, or diverting direct from the river when water was available for diversion. Plans for the distribution system of the project provided for the utilization of as many of these old community ditches as can be adapted to the project layout for main laterals and through reconstruction, enlargement, and extension to accommodate new areas. Practically all of these community ditches have been turned over to and are now being operated by the Reclamation Service and have been partially or wholly reconstructed. Only two entirely new main laterals were required, these being the Montoya and Island Main Laterals. There will be approximately 170 miles of main laterals, of which 105 are in the Mesilla Valley and 65 in the El Paso Valley. Sublaterals diverting from main laterals and main canals will total between 400 and 500 miles. About one-half of these were acquired with the community ditches and will have to be enlarged or reconstructed along with them, and about half will be new construction to serve lands not heretofore irrigated. It is estimated that the construction and reconstruction of the lateral system was approximately 50 per cent complete on June 30, 1921.

Drainage.—The drainage system now under construction when completed will consist of 350 miles of deep, open drains, involving the excavation of 17,000,000 cubic yards. The general drainage plan calls for the construction of 25 long main drains, 3 in the Rincon Valley, 13 in the Mesilla Valley, and 9 in the El Paso Valley, which outlet into the river at the extreme lower end of each division, and parallel the axis of the valley at average distances not exceeding 1½ miles apart. In addition there will be a number of stub drains to protect isolated areas not traversed by the main drains. On June 30, 1921, 16 main drains had been completed and construction was progressing on 6 others, with a total of 211.8 miles constructed to date, involving the excavation of 10,370,000 cubic yards, making the system as a whole 60 per cent complete.

Power.—At the time of the construction of the Elephant Butte Dam six power gates and penstocks were incorporated in the structure, but the construction of the power plant has been left to a future date. It is estimated that a power plant with an output of 18,000 kilowatts would not be an overdevelopment of the site. A number of high-line canal projects have been investigated, but none has been found to be feasible under present conditions, although there is possibility for future development along these lines.

SUMMARY OF GENERAL DATA FOR RIO GRANDE PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		150,000
Public land entered to June 30, 1921	550	
Public land withdrawn on June 30, 1921	1,650	
State land unsold, June 30, 1921	2,490	
Private land June 30, 1921	145,310	
Acreage Service could have supplied in season of 1920		109,000
Estimated acreage Service can supply in season of 1921		109,000
Estimated acreage Service can supply in season of 1922		120,000
Acreage irrigated season of 1920		82,960
Acreage cropped under irrigation season of 1920		77,880
Crops:		
Value of irrigated crops season of 1920		$4,639,200.00
Value of irrigated crops per acre cropped		59.60
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$1,000,000.00	
Unencumbered balance previous appropriations	1,045,762.96	
Miscellaneous collections and transfers issued	277,235.47	
Increase of compensation	126,215.13	
Total amount authorized		2,449,213.56
Encumbrances—		
Disbursements and transfers received	1,234,731.42	
Current liabilities	117,921.41	
Contingent liabilities	65,290.04	
Increase of compensation	126,239.25	
Total encumbrances		1,544,182.12
Unencumbered balance as of July 1, 1921		905,031.44
Fiscal year 1922—		
Amount specified in appropriation act		1,900,000.00
Fiscal year 1923—		
Proposed appropriation		1,100,000.00
Inventories:		
Value of stock on hand		314,710.17
Value of plant and equipment in use		341,961.50
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$11,764,797.51	
Less revenues and adjustments	1,118,911.83	
Net cost to June 30, 1921		10,645,885.68
Per cent completed on June 30, 1921	74	
Estimated per cent completed on June 30, 1922	78	
Estimated per cent completed on June 30, 1923	83	
Value of construction water-right contracts and other resources to repay net cost of project		7,650,000.00
Revenues held in reserve		1,118.05
Drainage:		
Total cost of drainage works to June 30, 1921		$1,768,238.55
Miles of open drains built to June 30, 1921		211.8
Estimated acreage damaged by seepage on June 30, 1921		49,000
Estimated acreage protected by drains to June 30, 1921		88,500
Estimated acreage to be protected by authorized system		150,000

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.	Uncollected.
Rentals, irrigation water	$1,074,550.44	$1,055,222.00	$19,328.44
Rentals, power	2,243.33	2,243.33	.....
Rentals, grazing and farming lands	1,118.05	1,057.55	60.50
Contractors' freight refunds	7,090.94	6,964.75	126.19
Miscellaneous	22,236.38	17,299.10	4,937.28
Total	1,107,239.14	1,082,786.73	24,452.41

CONSTRUCTION DURING FISCAL YEAR.

General.—With drainage construction 60 per cent complete practically all of the previously cultivated land, especially the more intensively cultivated areas, has been drained and restored to its former state of productivity, and the bringing back of this land into cultivation, as well as the addition of new areas which have been drained, is taxing the distribution system to more than its capacity. The enlargement, construction, and improvement on the canal and lateral system are becoming more and more urgent, and before extending the delivery end of the distribution system to any considerable extent, it has been thought advisable first to provide sufficient capacity on the supply end. Following out this plan of development, maximum construction efforts on the project during the winter months or the nonirrigation season of the past fiscal year were directed toward increasing and improving main canal and diversion facilities, and considerably more work was accomplished along reconstruction and improvement lines than in any previous year. With sufficient diversion facilities more attention will now be directed toward extensions of the lateral systems for which there are persistent demands.

Storage.—With the Elephant Butte Reservoir nearly filled during the season of 1920, attention was directed toward the possible effects of spilling any considerable quantity of water over the spillway, and it was generally conceded that with the unstable geological formation immediately below the spillway, serious damage might result to the main structure, and plans were formulated for the construction of a concrete-lined spillway channel back to the river below the dam. When the pavement was placed on the embankment, the rock used was of a poor grade of sandstone secured from a nearby quarry. About 25 per cent of the paving rock disintegrated rapidly on exposure to the air, and methods for repair had been under consideration for some time. The need for this was emphasized by the effect of wave action during highest reservoir stage. Estimates showed that the best kind of pavement to use would be 6-inch reinforced-concrete pavement. In October preliminary work was begun for the construction of the embankment pavement and spillway channel. The paving itself was completed on June 16, and excavation for the spillway channel was approximately 80 per cent complete on June 30. The same pitting effect which made it necessary to renew the throat liners on the balanced valves developed to such an extent on the balanced valve plugs that the semisteel originally 2 inches thick was entirely pitted through and plans were developed for replacing the semisteel plugs with bronze. Two of these for the lower balanced valves were purchased.

Canal system.—Maximum construction efforts during the winter months while water was out of the canals were directed toward improvement of the main channels, and the principal work along this line was on the following features: Raising of banks on the lower end of the Leasburg Canal and its extension; raising of the West Side Canal between drops 4 and 5 and the reconstruction of the Chamberino-San Miguel Lateral headings; the extension of the West Side Canal by the enlargement and reconstruction of the La Union East Canal and the Canutillo Canal to the Montoya Siphon; construction during January and February of the Montoya Siphon. All of the earthwork was handled by drag-line excavators except the Canutillo Canal section, which was handled by local contractors. The Franklin Canal headworks, consisting of head gates and sluice gates, were doubled in capacity and a 150-foot sand diversion weir constructed, and the concrete lining raised 3 feet for a distance of 3,000 feet below the heading. The Franklin Feeder Canal was enlarged from a capacity of 200 feet to 450 feet. This was done by the Bucyrus 30B drag-line excavator.

Lateral system.—The principal work on main laterals during the year was the reconstruction and enlargement of the first 3.4 miles of the Chamberino Lateral by drag-line excavator; reconstruction and extension of the Salatral Lateral, the first 7.6 miles by contract and the last 4 miles by P. & H. drag line. The Island Main Lateral was also enlarged from 102 to 160 second-feet capacity for the first 3 miles. Sublateral construction in the Mesilla Valley included the construction of Louisiana extension and Lester Lateral by contract; the reconstruction of the Gilliam and Archer Lateral by Government forces; the construction of the Santo Tomas River Lateral and Levee; extension of Archer Lateral; construction of the Brazito Lateral and Newsom and Vinton Laterals by drag-line excavator. Sublateral construction in the El Paso Valley included the Playa Lateral and Levee, the Rogers Lateral and Levee, and the Island River Lateral and Levee by drag-line excavator, the construction of the Crismore Lateral and the Knox Lateral in the Tornillo area and the I-206 Lateral on the island by Government forces.

SEEPAGE AND DRAINAGE.

Investigations.—No extensive drainage investigations were carried on during the year. Test wells were placed in the Picacho area. Aside from this the only ground-water investigations carried on were confined to special localities where questions arose as to the proper location for drain. Drainage discharges were secured semimonthly throughout the year, and salt content illustrations were made semimonthly throughout the year for all main drains. These have been plotted to date on curves. About the only point observed not heretofore mentioned is that the highest percentages of salt content occur simultaneously with the highest drainage discharges, which occurred during the height of the irrigation season, showing that the excess irrigation water reaching the drains directly is leaching the salt from the land.

Construction.—In the Rincon Valley drainage construction progressed throughout the year with the operation of the Monighan 1T drag line on the Garfield Drain. In the Mesilla Valley the only

machine which worked continuously on drainage throughout the year was the Monighan 2T, excavating the Del Rio Drain. Two Bucyrus class 9½ drag lines continued on drainage except during the winter months while engaged on canal and lateral work, one of these working on the Dona Ana Drain and the other on the La Mesa and Santo Tomas Drains. The Nemexas Drain was completed in the early part of the fiscal year by a third Bucyrus, which then began the West Side Canal extension. The fourth Bucyrus drag line in the Mesilla Valley was transferred to the Shoshone project in July, 1920, and in the El Paso Valley two Bucyrus drag-line excavators worked alternately on drains and laterals. One of these machines, after excavating a portion of the Playa Drain, completed the Playa Lateral and Levee before going back to the drain. The other machine working on the island completed the Rogers Lateral and Levee and the Island River Lateral and Levee, and had almost completed the Fabens Drain on June 30. A contract was awarded to the Jennings Construction & Engineering Co. at 13 cents per cubic yard for the construction of the second schedule of the Tornillo Drain, outletting through a temporary outlet. During the fiscal year 32.6 miles of open drain were constructed, involving the excavation of 1,760,000 yards, all of which except 2.6 miles were constructed by Government machines. At the end of the fiscal year 16 main drains had been completed and construction was progressing on 6 others. A total of 211.8 miles of open drain had been constructed, involving excavation of 10,370,000 cubic yards, making the drainage system for the project 60 per cent complete. The average cost per mile of drain to date was $8,600, and the net excavation cost 7.6 cents per cubic yard for all Government-operated machines.

Results of drainage.—On June 30, 1921, it was estimated that 88,500 acres were protected by the 211.08 miles of constructed drain, and the results of drainage are gratifying. The leaching of the land is taking place much more rapidly than was anticipated, especially where any degree of intelligence has been used in the leaching operations. The effect of the drains of lowering the ground water table has been discussed in previous reports.

Surveys.—Besides the necessary location and construction surveys on canals, laterals, and drains, a silt survey was made of Elephant Butte Reservoir for the purpose of determining the reduction in storage capacity on account of silting. This consisted in taking soundings over sections previously established across the reservoir at approximately one-half mile intervals, by triangulation. On the irrigable area and farm-unit surveys considerable work was done on land classification and correction of ownership preparatory to submitting notices to the irrigation district for the collection of construction charges.

IRRIGATION DISTRICTS.

Construction work on the Rio Grande project is being performed under contracts with the Elephant Butte Irrigation District for 86,000 acres of land in New Mexico, and the El Paso County Water Improvement District No. 1 for 64,000 acres of land in Texas. These contracts are dated June 15, 1918, and January 17, 1920, and involve the expenditure of $6,530,000 and $4,941,000, respectively, in the two districts. The Tornillo area, first organized as the El Paso

County Conservation and Reclamation District No. 2, dissolved their organization and at an election held by the El Paso County Water Improvement District No. 1 on October 1, this area was voted to be included within the district boundaries and drainage construction work was begun in this area under the contract above mentioned. The Las Palomas Valley has organized as an irrigation district, but this valley is not now considered a part of the project and no contracts have been entered into.

Opening notices.—Under date of December 11, 1920, notices were served by the Secretary of the Interior on the Elephant Butte Irrigation District for the collection of the first installment of construction charges on 50,000 acres in the New Mexico portion of the Mesilla Valley and on the El Paso County Water Improvement District No. 1 for 5,000 acres of the Mesilla Valley in Texas and 30,000 acres in the El Paso Valley. These charges which were to be collected through the district organizations during the year 1921, were based on an opening construction charge of $90 per acre. Because of the financial stringency prevailing, low prices for farm produce, and damages caused by a severe late killing frost, the beginning of payments of construction charges has been deferred one year.

ECONOMY OF GOVERNMENT WORK.

During 1920, 39.4 miles of drains, totaling 2,094,323 cubic yards of excavation, were excavated by Government-owned drag lines, at an average unit cost of slightly less than 8 cents per cubic yard. The lowest bid received for similar work in response to advertisements was 12 cents per cubic yard. This price included clearing right of way and taking down and rebuilding fences, which was not included in the unit cost given for Government work. This was estimated at 1 cent by the contractor in arriving at his bid price, making his price for the work covered by the Government cost figure 11 cents per cubic yard. The saving from the Reclamation Service doing the work was therefore 3 cents per cubic yard, or approximately $63,000 for the year.

Canal and lateral excavation to a total of 395,838 cubic yards was done by drag lines during 1920. No bids for doing this work with excavators were obtained from contractors, it being impracticable to do this on account of the smallness of the different jobs and because of their being widely scattered over the project. Bids for excavation by team for a large amount of work, advertised in December, 1920, however, brought bids ranging from 22 to 35 cents per cubic yard. The Reclamation Service cost averaged 10.8 cents, indicating a saving of at least 10 cents a cubic yard, or approximately $40,000 on canal and lateral excavation during 1920.

The largest contract for lateral construction, let as a result of the advertisements in December, was made at 30 cents per cubic yard and involved 96,870 cubic yards of excavation. Smaller canals, other conditions being similar, have been built during the first half of 1921, at 11 cents a cubic yard, with small drag lines recently purchased. Had it been possible to do the work contracted for under this and other contracts made at the same time with Government excavators, a saving of about $25,000 would have been effected.

In the February, 1921, issue of Organized Farming, in an article entitled "Post Mortem of the Community Ditch," Mr. H. H. Brook,

president of the Elephant Butte Irrigation District, gives the following table showing a comparison of cost of operating the canal system of the Mesilla Valley on this project with the cost of operating the various ditch systems of the valley under the community system prior to the time these were taken over by the Reclamation Service and incorporated in the present general system of the valley.

Community ditches and United States Reclamation Service compared.

Year.	Dona Ana Ditch.	Mesilla Ditch.	Las Cruces Ditch.	Three Saints Ditch.	La Union Ditch.	U. S. R. S.	
						Mesilla Valley.	Rincon Valley.
1915	$1.40						
1916	1.00	$1.15	$2.75				
1917	2.10	3.25	2.00	$4.40	$3.05		
1918–19	3.00	1.75	2.35	3.55	2.90		
1919	1.00				3.00	$2.39	$2.39
19-0						2.78	2.30
Total	8.50	6.15	7.10	7.95	8.95		
Average per year	2.12½	2.05	2.37	3.97	2.98	[1] 2.78	2.30
Plus per acre:							
Watchers at checks (estimated)	.12½	.12½	.12½	.12½	.12½		
Maintenance of individual turnouts and checks (estimated)	.10	.10	.10	.10	.10		
Less 5 per cent discount for payment on time						.14	.11½
Grand total per acre per year	2.35	2.27½	2.59½	4.20	3.20½	2.64	2.18

[1] Average cost of United States Reclamation Service in 1919 was $2.39 per acre.

Various other illustrations of the economy of work done under Government management could be cited. Among the minor items of this nature might be mentioned the manufacture of repair parts for dragline and other machinery in the project shops in El Paso. A comparison of these costs with the prices charged for the same parts by the manufacturing company shows a saving varying from 25 to 75 per cent.

OPERATION AND MAINTENANCE.

During the year 1920 the Reclamation Service delivered water on a rental basis to 73,000 acres of land with charges for water at the rate of $1.75 for the first 2 acre-feet, $1 for the third acre-foot, and $1.25 per acre for any water in excess of 3 acre-feet. In addition a charge of 50 cents per acre is made for reservoir service. Where project lands have not been provided with irrigation, carriage, and distribution systems, a flat charge of $1.25 per acre is made for the delivery of storage water from the Elephant Butte Reservoir and its carriage in the Rio Grande. Lands outside of the project are furnished surplus water at the rate of $2.25 per acre.

The total amount of water delivered to project lands during 1920 was 226,464 acre-feet, giving a duty of approximately 2.95 acre-feet per acre, measured at the point of delivery to the individual.

The water charge for 1921 will be $2 for the first 2 acre-feet, $1 for the third, and $1.25 for each additional acre-foot. The increase is to cover deficit of 1920.

Plans were made during the fall of 1920 to open about 84,000 acres under public notice, including 50,000 acres in the Mesilla Valley and 34,000 acres in the El Paso District. All irrigable lands within that area will pay the minimum operation and maintenance charge.

All community canals are now being operated and maintained by the Reclamation Service, and the sublaterals are being taken over as fast as the money is available for reconstruction.

The most serious problems in the operation of the project are the sand in canals and the plant growth on canal banks and in drainage ditches. It is expected that the sand-skimming weir now in operation will materially assist in clearing the sand difficulties, but some cheap method has yet to be devised for the weed problem.

Historical review, Rio Grande project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	45,000	85,000	88,000	92,300	107,000	109,000
Acreage irrigated	33,876	62,513	64,308	64,781	70,000	[1] 73,346
Miles canal operated	37	75	86	153	385	546
Water diverted (acre-feet)	[2] 199,952	[2] 420,646	[2] 622,177	[3] 613,638	[3] 354,704	[3] 451,888
Water delivered to land (acre-feet)	.....	.....	.....	[4] 348,296	[4] 174,945	[4] 226,464
Per acre of land irrigated (acre-feet)	5.90	6.73	8.0	5.37	2.5	2.95

[1] Land irrigated through Government-operated distribution system only ; does not include approximately 10,000 acres in Picacho, Island, and Tornillo still irrigating from community ditch diverting direct from the river.
[2] Measured at point of delivery from canals.
[3] Total diversions, including water wasted and rediverted from river below.
[4] Includes delivery to farms by United States Reclamation Service operation and to heads of community ditches.

SETTLEMENT.

The successful operation of the drainage system, and the climate, water, soil, and comparative cheapness of good farm land attracted a number of purchasers from other projects and a large number of transfers were made during the winter of 1919 and spring of 1920. The successful growing of cotton on the project, as demonstrated during 1919, was also a factor in the sale of lands.

Considerable leveling was done on lands that had been in cultivation for a number of years. Farm lands near the city of El Paso are being divided into small tracts and sold for suburban homes. Large tracts adjacent to the project were sold and put under cultivation.

Settlement data, Rio Grande project, by calendar years.

	1916	1917	1918	1919	1920
Total number of farms	1,638	1,700	2,287	2,703	3,021
Population	10,431	10,500	10,259	12,890	12,199
Number of irrigated farms	1,638	1,700	2,287	2,703	3,021
Operated by owners	1,145	1,170	1,377	1,966	2,668
Operated by tenants	493	530	910	737	353
Number of towns	25	25	27	27	32
Population	86,600	86,600	87,997	89,316	95,083
Total population in towns and on farms	96,762	97,100	98,256	102,206	107,282
Number of public schools	52	52	52	54	102
Number of churches	80	81	82	83	105
Number of banks	18	18	18	17	14
Total amount of capital stock	$3,000,000	$3,000,000	$3,000,000	$3,250,000	$2,990,000
Amount of deposits	$29,282,455	$31,000,000	$32,000,000	$33,000,000	$30,898,499
Number of depositors	40,000	40,000	40,000	44,000	31,716

PRINCIPAL CROPS.

The principal crops produced during 1920 were alfalfa, cotton, wheat, and corn. The yield of alfalfa was greater than in 1919, owing to lowering of ground water by drains and also to the use of fertilizer. A considerable acreage was planted to cotton, and the yield was very satisfactory, some fields yielding as high as 2 bales per acre. However, the drop in price will probably make it more profitable to produce other crops. The wheat yield was about equal to that of 1919, although some fields that were seeded to Burbank superwheat produced 60 bushels per acre.

There was considerable increase in the acreage planted to cantaloupes. This crop promises to be of considerable importance to the project, as the quality of the melons is excellent and the yields very satisfactory.

The yields for all crops during 1920 were generally very satisfactory.

Crop report, Rio Grande project, New Mexico-Texas, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	27,099	Ton	82,141	3.03	$23.13	$1,900,000	$70.11
Alfalfa seed	152	Bushel	443	2.91	17.27	7,650	50.34
Apples	510	Pound	863,350	1,691.18	.03	26,400	51.72
Barley	909	Bushel	20,352	22.39	1.48	30,106	33.12
Beans	615	...do	5,392	8.76	3.75	20,215	32.84
Cabbage	119	Ton	627	5.27	56.45	35,392	297.41
Cane	1,699	...do	5,695	3.35	11.60	66,040	38.88
Canteloupes	2,232	Crate	642,785	287.99	.20	131,770	59.04
Chili	20	Pound	49,000	2,450.00	.06	2,907	145.35
Corn fodder	498	Ton	892	1.79	8.09	7,214	14.48
Corn:							
Indian	10,544	Bushel	224,527	21.30	1.38	310,617	29.46
Sorghum, cane	88	Ton	284	3.23	12.18	3,460	39.32
Sorghum, seed	268	Bushel	6,654	24.87	1.07	7,150	26.73
Cotton	15,996	Pound	6,972,300	435.88	.16	1,141,400	71.35
Cotton seed	6,870	...do	3,963,689	576.96	.01	46,894	6.82
Flowers (roses)	8	Bushel				15,969	1,996.12
Fruits, small	177	Pound	346,820	1,959.44	.04	15,780	89.15
Garden	2,373					195,620	82.44
Hay	785	Ton	1,402	1.78	16.46	23,080	29.40
Millet seed	10	Bushel	160	16.00	1.91	306	30.60
Oats	332	...do	11,773	35.46	.92	10,888	32.80
Onions	131	...do	19,842	151.44	1.25	24,727	188.76
Pasture	5,120					68,730	13.42
Peaches	47	Pound	48,380	1,023.92	.04	1,992	42.16
Pears	576	...do	2,066,820	3,586.67	.04	88,015	152.74
Peas	114	Bushel	2,334	20.43	2.73	6,368	55.74
Potatoes:							
Sweet	365	...do	33,670	92.25	1.34	45,155	123.71
White	9	...do	166	18.44	1.42	236	26.22
Prunes	9	Pound	33,000	3,666.67	.04	1,320	146.66
Rye	71	Bushel	1,220	17.18	2.34	2,860	40.28
Tomatoes	30	Pound	116,100	3,870.00	.04	4,340	144.67
Truck, small	33					3,150	95.45
Watermelons	116	Pound	391,584	3,375.72	.03	12,350	106.47
Wheat	8,335	Bushel	166,974	20.03	2.28	381,099	45.72
Less duplicate areas	8,380						
Total cropped	77,880	Total and average				4,639,200	59.60

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:					
Miscellaneous	5,480				
Less duplicated areas	400				
Total irrigated	82,960				
		Total irrigable area farms reported	139,246	3,180	.....
		Total irrigated area farms reported	82,960	3,180	.....
		Under rental contracts	83,065	3,295	.....
		Total cropped area farms reported	77,880	3,180	.....

FINANCIAL STATEMENT.

Condensed financial statement, Rio Grande project, June 30, 1921.

DEBIT.

Collections on hand and in special deposit			$9,573.37
Inventory of materials and supplies on hand			314,710.17
Plant and equipment in use			341,961.50
Current accounts receivable			24,452.41
Construction charges not due			7,650,000.00
Unearned value of contracts			65,290.04
Construction cost of works		$10,751,144.19	
Operation and maintenance during construction		1,013,653.32	
Gross construction cost		11,764,797.51	
Less revenues and adjustments during construction period		1,118,911.83	
Net construction cost			10,645,885.68
Investment items in transit			16,656.20
Total debits			19,068,529.37

CREDIT.

Current accounts payable			125,503.10
Contingent and deferred liabilities			74,863.41
Resources for repaying cost of project			7,650,000.00
Revenues held in reserve			1,118.05
Investment:			
Disbursements and transfers from other projects	$12,946,777.14		
Items in transit	16,664.09		
Total		$12,963,441.23	
Less collections and transfers to other projects	1,746,388.53		
Items in transit	7.89		
Total		1,746,396.42	
Net investment			11,217,044.81
Total credits			19,068,529.37

Construction cost and revenue, Rio Grande project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys:		
Project general	.....	$76,740.11
High-line canal	.....	47,753.61
Silt deposits, Elephant Butte Reservoir	[1] $10,611.73	.....
Hydrographic survey, New Mexico	.....	5,534.43
Hydrographic survey, Colorado	.....	15,409.70
Drainage investigations, San Luis Valley	.....	7,286.53
San Marcial investigations, New Mexico	[1] 1,792.34	.....
Topographic surveys, Tornillo and Fort Hancock Districts	.....	14,857.73
Rio Grande hydrometry	.....	2,847.76
Power plant No. 2	.....	107.75
Palomas Valley Canal system	.....	2,405.07
Palomas Valley Drainage system	.....	20.41
Palomas Valley flood protection	.....	33.43
Palomas Valley farm units	.....	3,352.33
Tornillo Valley Canal system	[1] 927.42	.....
Tornillo Valley Lateral system	[1] 2,255.99	.....
Tornillo Valley Drainage system	[1] 1,475.52	.....
Tornillo Valley farm units	[1] 2,672.88	.....
Total, examination and surveys	[1] 19,735.88	176,348.86
Storage system, Elephant Butte Reservoir:		
Preliminary and general	.....	398,350.48
Elephant Butte Dam	[1] 145,067.78	4,094,841.41
Embankment	141,177.16	271,123.20
Spillway	115,439.24	239,900.59
Silt survey	9,896.03	9,896.03
San Marcial investigations	1,792.34	1,792.34
Total, storage system	123,236.99	5,015,904.05
Canal system:		
Rincon system	2,922.82	838,158.31
Leasburg system	25,772.81	311,990.26
Mesilla system	117,417.95	646,085.57
El Paso Valley system	167,587.75	801,198.19
Tornillo system	1,920.79	1,920.79
Montoya system	17,044.17	17,044.17
Total, canal system	332,666.29	2,616,397.29

[1] Contra.

Construction cost and revenue, Rio Grande project—Continued.

Features.	Fiscal year 1921.	To June 30, 1921.
Lateral system:		
Rincon system	$3,322.77	$43,842.09
Leasburg system	32,997.61	194,720.86
Mesilla system	61,053.59	183,997.27
El Paso Valley system	101,240.72	448,571.46
Montoya District	1,059.62	46,266.99
Tornillo District	8,337.60	8,337.60
Total, lateral system	208,011.91	925,736.27
Drainage system:		
Rincon system—		
Surveys and testing	572.86	6,482.52
Drain construction	33,419.80	52,697.38
Mesilla system—		
Surveys and testing	5,803.01	51,696.37
Drain construction	148,622.61	931,636.30
El Paso Valley system—		
Surveys and testing	2,750.59	43,458.25
Drain construction	101,031.38	653,395.59
Tornillo District—		
Surveys and testing	2,838.64	2,838.64
Drain construction	21,545.57	21,545.57
Montoya District—		
Surveys and testing	159.04	1,487.93
Total, drainage system	316,743.50	1,768,238.55
Flood protection:		
Rincon Valley system	.....	479.57
Leasburg system, cut-off in river channel	.....	14,780.61
Mesilla Valley system	8,449.82	15,038.52
El Paso Valley system	5,680.35	8,616.83
Montoya District, surveys and testing	.....	76.53
Total, flood protection	14,130.17	38,992.06
Farm units:		
Rincon Valley system	.....	21,314.08
Leasburg system	.....	15,639.59
Mesilla Valley system	640.97	67,548.87
El Paso Valley system	4,108.99	38,071.85
Montoya District	.....	1,852.92
Tornillo District	3,720.60	3,720.60
Total, farm units	8,470.56	148,147.91
Permanent improvements:		
Leasburg system—		
Buildings	.....	3,053.02
Roads	.....	10,375.60
Mesilla Valley system—buildings	.....	1,543.90
El Paso Valley system—buildings	61.27	4,873.76
Rincon Valley system—buildings	.....	2,242.29
Montoya District—buildings	.....	899.98
Elephant Butte Dam—roads	.....	26,612.37
Total, permanent improvements	61.27	49,600.92
Telphone system:		
Leasburg system	.....	1,400.52
Mesilla system	.....	8,761.24
Rincon system	604.61	612.14
El Paso system	611.94	1,004.38
Total, telephone system	1,216.55	11,778.28
Subtotal, construction	984,801.36	10,751,144.19
Operation and maintenance during construction (water rental basis)	255,398.91	1,013,653.32
Total cost, construction	1,240,200.27	11,764,797.51
Less revenues earned and adjustments during construction period:		
Rentals of buildings	4,941.09	21,128.45
Freight refunds	[1] 406.35	7,090.94
Doubtful accounts	3,886.66	2,147.31
Field cost adjustments	[1] 4,804.06	[1] 5,838.63
Profit on hospital operations	7,095.20	16,607.70
Rentals of irrigation water	172,261.95	1,074,550.44
Other revenues, unclassified	92.05	3,225.62
Total	183,066.54	1,118,911.83
Net cost of project	1,057,133.73	10,645,885.68

[1] Contra.

Cost, by calendar years, Rio Grande project.

	Construction.	Operation and maintenance during construction.	Total.
Year ending Dec. 31—			
1906	$24,589.24		$24,589.24
1907	141,484.18	$2,398.86	143,883.04
1908	153,567 87	2,400.51	155,968.38
1909	105,421.86	1,890.88	107,312.74
1910	334,599.30	4,435.18	339,034.48
1911	585,991.02	5,303.18	591,294.20
1912	859,515.72	5,587.05	865,102.77
1913	942,232.25	23,864.19	966,096.44
1914	2,099,399.24	30,736.25	2,130,135.49
1915	901,476.03	47,770.61	949,246.64
1916	520,271.53	58,346.46	578,617.99
1917	476,912.70	78,764.78	555,677.48
1918	1,054,710.90	124,295.63	1,179,006.53
1919	1,208,718.56	241,051.38	1,449,769.94
1920	524,341.57	236,372.44	760,714.01
To June 30, 1921	817,912.22	150,435.92	968,348.14
Total	10,751,144.19	1,013,653.32	11,764,797.51

Cost, by fiscal years, Rio Grande project.

	Construction.	Operation and maintenance during construction.	Total.
Year ending June 30—			
1907	$89,757.29		$89,757.29
1908	174,949.01	$2,138.18	177,087.19
1909	113,335.41	1,167.54	114,502.95
1910	259,654.15	6,856.40	266,510.55
1911	303,292.41	5,680.44	308,972.85
1912	777,317.32	5,678.88	782,996.20
1913	947,304.36	7,447.45	954,751.81
1914	1,451,013.42	33,490.27	1,484,503.69
1915	1,500,688.47	47,277.71	1,547,966.18
1916	940,642.06	41,396.66	982,038.72
1917	382,841.93	68,586.76	451,428.69
1918	813,596.10	117,904.34	931,500.44
1919	1,292,183.74	169,675.60	1,461,859.34
1920	719,767.16	250,954.18	970,721.34
1921	984,801.36	255,398.91	1,240,200.27
Total	10,751,144.19	1,013,653.32	11,764,797.51

General expense, Rio Grande project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$22,410.28	$12,296.67	$34,706.95	$248,766.33	$29,443.90	$278,210.23
Project office	35,465.69	19,470.87	54,936.56	442,697.02	76,929.91	519,626.93
Denver office	9,658.92	5,296.85	14,955.77	89,097.64	18,112.40	107,210.04
District counsel's office	4,228.67	2,320.31	6,548.98	29,974.35	5,266.03	35,240.38
Other offices and miscellaneous				18,470.94	987.27	19,458.21
Total	71,763.56	39,384.70	111,148.26	829,096.28	130,739.51	959,745.79
Percentage of general expense to gross cost	7.2	15.4	9.0	7.7	12.8	8.1

NORTH DAKOTA, NORTH DAKOTA PUMPING PROJECT.

W. S. Arthur, project manager, Williston, N. Dak.

LOCATION.

County: Williams.

Townships: 152 to 155 N., Rs. 100 to 104 W., fifth principal meridian.

Railroad: Great Northern.

Principal cities and towns and estimated population June 30, 1921: Buford, 75; Trenton, 150; and Marley (less than 25) are unincorporated villages. Williston, on the Williston Division, is an incorporated city of about 4,500 population, and Springbrook, the shipping station for the north half of the Williston Division, an unincorporated village of less than 500.

WATER SUPPLY.

Source of water supply: Missouri River.

Area of drainage basin: 15,000 square miles.

Mean run-off of Missouri River near Williston, May to October, 1905 to 1907: 15,000,000 acre-feet.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1921: Williston Division 7,653 acres, which is the acreage under contract with the Williston Irrigation District.

Length of irrigation season: 80 days, beginning from June 1 to June 15.

Average elevation of the irrigable area: 1,900 feet above sea level.

Rainfall: The actual precipitation, calendar year 1920, was 13.13 inches. The average for 17 years, beginning in 1904, is 13.12 inches. In 1920, 53 per cent of the precipitation came after the growing season.

Average of highest recorded temperature for 17 years, 99° F.; average of lowest recorded temperature for the same period, −37° F.

Character of soil on irrigable area: Ranges from sandy loam to heavy clay gumbo.

Principal products: Alfalfa, grains, vegetables. The production of corn for silage is increasing as well as the output of hogs, and dairying has become well established.

Principal markets: St. Paul, Minneapolis, Duluth, Chicago. The local market is now important, since it consumes all of the butter product and all of the output from the dairies.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Buford-Trenton Division, April 8, 1908; March 9, May 13, 1911; June 25, 1912; July 15, 1913; February 26, March 7, 1914. Williston Division, April 27, November 30, 1908; April 30, 1909; March 9, April 14, 1911; June 25, 1912; March 11, June 23, July 15, July 21, 1913; February 26, March 7, 1914.

Location of lands opened: Buford-Trenton Division, Tps. 152 and 153 N., Rs. 103 and 104 W., fifth principal meridian; Williston Division, Tps. 154 and 155 N., Rs. 100 and 101 W., fifth principal meridian.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: Two acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $38 under public notice of 1908.

Operation and maintenance charge: For the season of 1921 the irrigation district fixed the operation and maintenance charge at $3.50 per acre, which includes 1 acre-foot of water, and $2 per acre-foot for water delivered in excess of 1 acre-foot per acre. The district added 40 cents per acre for running expenses of the district.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers September 22, 1905.

Construction authorized by Secretary January 23, 1906.

First part: Buford-Trenton Division completed November, 1907.

Power and pumping plants: Williston Division, completed for present use in the fall of 1907; first part completed in the spring of 1908.

Pumping plant and transmission lines: Buford-Trenton Division, completed for present use in the spring of 1908.

First irrigation by Reclamation Service, season of 1908.

Power installation completed for 2,000 horsepower June 30, 1910.

Buford-Trenton Division, 38 per cent completed June 30, 1920; Williston Division, 64 per cent completed June 30, 1920.

Entire project, 64 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the North Dakota pumping project provides for a central steam-power plant located near Williston, operating pumps and generating electricity for the operation of other pumps on the Buford-Trenton and Williston Divisions. On the Buford-Trenton Division water is pumped from the Missouri River by pumps on a barge into a settling basin 30 feet above the river, and is then lifted by a permanent pumping station into a canal, 50 feet above the settling basin, for the irrigation of bench lands near Buford. A transmission line 28.3 miles in length delivers power for the operation of the pumps. The plan of the Williston Division provides for a series of motor-driven centrifugal pumps on a barge in the Missouri River, a settling basin receiving the water from the barge, and a main canal of 90 second-feet capacity extending along Little Muddy Creek to the power plant, where two sets of steam-driven turbines operate centrifugal pumps to lift water 51 feet into E Canal. From the main canal, about midway between the river and the power plant, electrically-driven pumps raise 35 second-feet 28 feet into B Canal, and from the B Canal 20 second-feet are raised an additional 28 feet into C Canal. The main power station is located close to a 9-foot vein of lignite coal, from which fuel is obtained.

The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: The central power station, coal mine, and transmission lines; at Buford-Trenton Division, two pumping stations, settling basin, and canal system; at Williston Division, four pumping stations, two settling basins, and canal system. No construction work is in progress at present.

Features remaining for future construction are: The enlargement of the power house and installation of additional machinery; at Buford-Trenton Division, extension of Highline Canal and construction of Lowline Canal and laterals for irrigation of bottom lands; at Williston Division, construction of east and west bottom canal systems, with additional intake and pumping stations.

SUMMARY OF GENERAL DATA FOR NORTH DAKOTA PUMPING PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		25,710
Public land entered to June 30, 1921	513	
Public land open to entry on June 30, 1921	351	
State land unsold, June 30, 1921	1,029	
Private land June 30, 1921	23,817	
Acreage Service could have supplied in season of 1920		7,653
Estimated acreage Service can supply in season 1921		7,653
Estimated acreage Service can supply in season 1922		7,653
Acreage irrigated season 1920		2,810
Acreage cropped under irrigation season of 1920		2,740
Acreage dry farmed season of 1920 (estimated)		2,000
Crops:		
Value of irrigated crops season of 1920		$86,780.00
Value of irrigated crops per acre cropped		31.70
Value of dry-farmed crops season of 1920 (estimated)		16,000.00
Value of dry-farmed crops per acre cropped		8.00
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$119,000.00	
Miscellaneous collections and transfers issued	51,593.90	
Special appropriations, increase of compensation	5,792.66	
Total amount authorized		176,386.56

Finances—Continued.		
Appropriations—Continued.		
Fiscal year 1921—Continued.		
Encumbrances—		
Disbursements and transfers received	$93,897.65	
Current liabilities	3,915.48	
Increase compensation	5,797.53	
Total encumbrances		$103,610.66
Unencumbered balance as of July 1, 1921		72,775.90
Fiscal year 1922—		
Amount specified in appropriation act		115,000.00
Encumbrances in fiscal year 1921: Contingent liabilities		1,213.50
Unencumbered balance as of July 1, 1921		113,786.50
Fiscal year 1923—		
Proposed appropriation		145,000.00
Inventories:		
Value of stock on hand		15,154.84
Value of plant and equipment in use		10,750.19
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$696,607.16	
Less revenues and adjustments	11,180.45	
Net cost to June 30, 1921		685,426.71
Per cent completed on June 30, 1921	64	
Estimated per cent completed on June 30, 1922	64	
Estimated per cent completed on June 30, 1923	64	
Value of construction water-right contracts and other resources to repay net cost of project		368,058.23
Revenues held in reserve		1,298.18
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$392,937.13	
Less charges due and miscellaneous revenues	100,332.87	
Deficit		292,604.26
Drainage: Miles of open drains built to June 30, 1921		12.7

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Other credits.	Total.	
Construction charges	$26,396.37	$1,089.12	.....	$1,089.12	$25,307.25
Operation and maintenance charges (public notice)	47,939.79	21,783.58	.....	21,783.58	26,156.21
Rentals, irrigation water	2,948.58	2,149.03	$799.55	2,948.58	.....
Rentals, power	263,976.71	255,919.26	395.20	256,314.46	7,662.25
Rentals, grazing and farm lands	913.85	895.85	18.00	913.85	.....
Contractors' freight refunds	5,495.08	5,495.08	.....	5,495.08	.....
Miscellaneous	18,773.74	18,763.74	.....	18,763.74	10.00
Total	366,444.12	306,095.66	1,212.75	307,308.41	59,135.71

CONSTRUCTION DURING FISCAL YEAR.

Not all of the small ditches necessary to serve the lands in the Williston Division had been constructed, and for this reason about 3 miles of ditches of 3 to 5 second-feet capacity were constructed during the fiscal year 1921.

SEEPAGE AND DRAINAGE.

No seepage has developed from irrigation. The policy heretofore has been for the farmer to clean the waste ditches, but the directors of the irrigation district authorized the cleaning of the main waste ditches, not including subsidiaries, as part of the operation and maintenance cost.

ECONOMIES OF GOVERNMENT WORK.

Because of water bodies encountered and a dip in the coal seam it was necessary to continue development in the coal mine in order to secure a sufficient number of working places in dry coal for any season's demands. About 2,000 feet of entries were driven, which open two blocks north and two south of the main entries. Water bodies were passed and dry coal blocked out. This work necessitated timbering and track in all entries with corresponding heavy cost, but, as the fiscal year closes, all output is limited to wide or room work and the benefit of development is being secured. The coal mine costs were $35,750 for 13,832 tons of coal, or $2.58 per ton.

Of the total coal mine costs $4,762 remain undistributed as cost of development beyond working places used. The cost of coal used, therefore, including proper maintenance of the mine, was $2.24 per ton. During the year the retail price of coal has averaged $4.75 per ton and the local price for power purposes $3.50 to $4 per ton. On this basis the coal-mining operations show a saving of $1.26 per ton over the minimum price of coal sold for power-plant purposes.

In the power plant the cost of 2,113,291 kilowatt-hours of electrical energy generated was 3.42 cents per kilowatt-hour. The next lowest cost of which information is available, for current generated from lignite coal, is "approximately 4 cents." The power-plant costs, therefore, show a saving of 0.58 cent per kilowatt-hour over the lowest known costs for energy produced from North Dakota lignite.

These results were secured in face of the highest wages and material costs on record and demonstrate clearly the possibilities of the plant if a load near its possible output could be secured.

COMMERCIAL POWER.

The contract with the city of Williston remained in force and the plant was in operation the entire year to furnish power under this contract.

During the year 1,136,098 kilowatt-hours of electrical energy were delivered to the city switchboard. This represents an increase of 39,402 kilowatt-hours over the previous year. The first half of the fiscal year's operations were conducted at a loss but an adjustment period was reached January 1, and rates were revised. The profits of the second half of the year overbalanced the losses of the first half and the year's operations show a net gain of $1,084.09.

The chief value of the commercial power operations lies in their making it feasible to retain an operating force throughout the year, which it would be impracticable to assemble each year for irrigation operations. Under normal conditions the profit on these operations may be a material item in the reduction of net project costs.

Sale of commercial power, North Dakota pumping project.

	Cost.		Collection.		Profit or loss.	
	This month, fiscal year 1921.	Total Dec. 20, 1912, to date.	This month, fiscal year 1921.	Total Dec. 20, 1912, to date.	This month, fiscal year 1921.	Total Dec. 20, 1912, to date.
1920.						
July	$3,326.48	$216,650.74	$3,328 95	$218,995.73	$2.47	$2,344.99
August	3,084.23	219,734.97	3,303.75	222,299.48	219.52	2,564.51
September	3,767.36	223,502.33	3,580.00	225,879.48	[1] 187.36	2,377.15
October	4,007.05	227,509.38	3,859.75	229,739.23	[1] 147.30	2,229.85
November	4,766.74	232,276.12	4,154.50	233,893.73	[1] 612.24	1,617.61
December	6,657.60	238,933.72	4,191.63	238,085.36	[1] 2,645.97	848.36
Subtotal	25,609.46	.....	22,418.58	.....	[1] 3,190.88	.....
1921.						
January	3,994.06	242,927.78	4,791.25	242,876.61	797.19	[1] 51.17
February	3,526.41	246,454.19	4,463.75	247,340.36	937.34	886.17
March	3,658.50	250,112.69	4,437.15	251,777 51	778.65	1,664.82
April	3,700.35	253,813.04	4,141.75	255,919.26	441.40	2,106.22
May	3,528.35	257,341.39	3,858.25	259,777.51	329.90	2,436.12
June	2,813.51	260,154.90	3,804.00	263,588.51	990.49	3,426.61
Subtotal	21,221.18	.....	25,496.15	.....	4,274.97	.....
Sales to employees	.....	.....	.....	.....	.....	395.20
Grand total	46,830.64	[2] 260,154.90	47,914.73	[2] 263,581.51	1,084.09	[2] 3,821.81

[1] Loss. [2] Totals to date, not column totals.

BOARD MEETINGS.

Date.	Subject.	Personnel.
Mar. 29, 1921	Status of project and of irrigation district	W. J. Egleston, district counsel; W. F. Kubach, examiner of accounts; W. S. Arthur, project manager.

This was the only meeting of the year which could be classed as a board meeting of reclamation officials. The board of directors of the Williston Irrigation District held regular monthly meetings. The board conducts the business of elections, assessments, petitions of farmers, and the routine business of the district. The office of the board is in the project office building and the board and the project officials work in close cooperation.

OPERATION AND MAINTENANCE.

During the fiscal year 1921 the power plant, coal mine, transmission and telephone lines, four pumping stations, and the Williston Canal system were operated.

The season of 1921 opened June 1 and water deliveries commenced June 4. Owing to heavy rains, pumping operations were temporarily suspended on June 19, after 16 days of irrigation, to be resumed after July 1.

Historical review, Williston Division, North Dakota pumping project.

Item.	1915	1916	1917	1918	1919	1920
Area for which Service was prepared to supply water	8,189	8,189	8,189	8,189	8,189	7,653
Acreage irrigated	.....	.....	.....	.....	2,446	2,810
Miles of canal operated	.....	.....	.....	.....	31	31
Water diverted (acre-feet)	.....	.....	.....	.....	4,028	4,000
Water delivered to land (acre-feet)	.....	.....	.....	.....	2,633	2,684
Water per acre of land irrigated (acre-feet)	.....	.....	.....	.....	1.08	0 97

SETTLEMENT.

There is no public land available for entry and settlement is practically stationary. Four years of drought and one year of financial stringency leave the dry-land farmer in no position to buy irrigated lands. It is hoped a plan can be worked out to put irrigable lands held by nonresidents into the hands of farmers now resident upon the dry lands, without the requirement of cash payments.

Settlement data, Williston Division, North Dakota pumping project.

Item.	1915	1916	1917	1918	1919	1920
Total number of farms on project	101	101	105	105	105	105
Population	163	175	190	195	200	200
Total number of irrigated farms	44					94
Operated by owners or managers	34	34	34	33	33	47
Operated by tenants	10	10	10	11	24	19
Operated by nonresidents						28
Population	140	152	155	160	181	194
Number of towns	2	2	2	2	2	2
Population	5,000	5,000	5,300	5,360	5,400	5,000
Population in towns and on farms	5,163	5,175	5,490	5,555	5,600	5,200
Number of public schools	5	5	6	6	6	6
Number of churches	6	6	6	6	6	6
Number of banks	3	3	4	4	4	3
Total capital stock	$135,000	$185,000	$235,000	$260,000	$260,000	$260,000
Amount of deposits	$1,300,000	$1,500,000	$1,800,000	$2,000,000	$1,756,000	$2,000,000
Number of depositors	3,000	3,300	3,500	3,800	3,600	5,010

PRINCIPAL CROPS.

The hay crop, including alfalfa, is the largest crop, with grain, potatoes, and corn following in the order named. Truck farming is rapidly taking an important place. The success of the project farmers will be worked out more readily through alfalfa, corn, and live stock, the latter including beef stock, dairy stock, and hogs.

Crop report, North Dakota pumping project, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	170	Ton	196	1.15	$20.00	$3,920	$23.02
Barley	102	Bushel	2,597	25.46	.64	1,662	16.29
Clover hay	20	Ton	38	1.90	20.00	760	38.00
Corn	55	Bushel	1,485	26.88	1.00	1,485	26.88
Corn fodder	134	Ton	602	4.54	15.00	9,030	68.10
Flax	59	Bushel	397	6.72	2.30	913	15.46
Garden	55	Acre				12,555	226.70
Hay, blue joint	397	Ton	335	.85	22.00	7,370	18.70
Hay, millet	340	...do	541	1.59	18.00	9,738	28.62
Hay, oat	114	...do	154	1.35	18.00	2,772	24.30
Hay, Sudan grass	20	...do	19	.95	18.00	342	17.10
Oats	615	Bushel	21,178	34.45	.36	7,624	750.00
Pasture	263	Acre				1,668	6.30
Potatoes	110	Bushel	10,980	101.20	1.50	16,470	151.80
Wheat	330	...do	5,032	15.26	1.86	9,358	28.38
Miscellaneous[1]	14					1,113	
Less duplicated areas	58						
Total cropped	2,740	Total and average				86,780	31.70
Irrigated, no crops:							
Young alfalfa	515						
Young sweet clover	157						
Young brome grass	17						
Miscellaneous	25						
Less duplicated areas	644						
Total irrigated	2,810						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	4,758	94	62
Total irrigated area farms reported	2,810	94	37
Total cropped area farms reported	2,740	94	36

[1] Beans, beets, buckwheat, onions, speltz, sudan grass seed.

FINANCIAL STATEMENT.

Condensed financial statement, North Dakota pumping project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$3,868.25
Inventory of materials and supplies on hand			15,154.84
Plant and equipment in use			10,750.19
Current accounts receivable			59,135.71
Construction charges not due			333,411.23
Unearned value of contracts			1,213.50
Construction cost of works		$695,302.89	
Operation and maintenance added to construction		1,304.27	
Gross construction cost		696,607.16	
Less revenues and adjustments during construction period		11,180.45	
Net construction cost			685,426.71
Operation and maintenance cost under public notice	$646,042.64		
Unadjusted clearing accounts	4,762.75		
		650,805.39	
Less operation and maintenance added to construction		1,304.27	
Gross operation and maintenance cost		649,501.12	
Less revenues and adjustments		315,850.76	
Deficit to Dec. 31, 1920	292,604.26		
Net cost Jan. 1 to June 30, 1921	41,046.10		
			333,650.36
Investment items in transit			179.16
Total debits			1,442,789.95

CREDITS.

Current accounts payable			3,920.17
Contingent and deferred liabilities			5,081.75
Resources for repaying cost of project			368,058.23
Revenues held in reserve			1,298.18
Investment:			
Disbursements and transfers from other projects	$1,583,854.05		
Items in transit	179.16		
Total		1,584,033.21	
Less collections and transfers to other projects		519,601.59	
Net investment			1,064,431.62
Total credits			1,442,789.95

Construction cost and revenue, North Dakota pumping project.

Features.	Fiscal year, 1921.	To June 30, 1921.
Examination and surveys		$44,969.88
Lateral system:		
Williston		141,292.90
Buford-Trenton	364.25	58,771.08
Total lateral system	364.25	200,063.98
Power system:		
Williston Division—		
Coal mine		14,062.89
Barge		39,200.34
Transmission line		16,252.40
Pumping station No. 4		8,187.44
Pumping station No. 2		13,914.03
Power house		177,900.62
Transformer station at barge		2,711.01
Floating boom at barge		763.86
Scow pontoon		1,395.28
Buford-Trenton Division—		
Transmission line		25,270.18
Barge		36,474.04
Pumping station A		36,559.78
Boom and scow pontoon		785.25
Extension to Williston power house		76,085.00
Total power system		449,562.12

Construction cost and revenue, North Dakota pumping project—Continued.

Features.	Fiscal year, 1921.	To June 30, 1921.
Permanent improvements and lands:		
Williston Division	.....	$22,969.48
Buford-Trenton Division	.....	5,850.13
Total permanent improvements and lands	.....	28,819.61
Operation and maintenance charges added to construction	[1] $20,887.66	1,304.27
Total cost of construction	[1] 20,523.41	724,719.86
Less Buford-Trenton materials and equipment sold:		
Barge	.....	5,449.73
Substation A	.....	12,120.79
Transmission line	.....	7,405.48
Miscellaneous salvage	3,118.89	3,136.70
Total credit by sales	3,118.89	28,112.70
Gross construction cost to June 30, 1921	[1] 23,642.30	696,607.16
Less revenue earnings during construction:		
Rental of buildings	836.74	5,488.62
Rental of irrigation water	.....	196.75
Freight refunds	.....	5,495.08
Uncollectible or unpayable accounts	799.55	.....
Total construction revenues	1,636.29	11,180.45
Net construction cost to June 30, 1921	[1] 25,278.59	685,426.71

[1] Contra.

Operation and maintenance cost and revenues for calendar year 1920 and total to Dec. 31, 1920.

Features.	Calendar year 1920.			To end of calendar year.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Pumping for irrigation:						
Williston pumping station No. 1	$9,648.70	$718.31	$10,367.01	$16,769.06	$867.78	$17,636.84
Williston pumping station No. 2	5,080.27	250.44	5,330.71	14,995.37	1,281.51	16,276.88
Williston pumping station No. 3	16,991.21	1,464.77	18,455.98	51,823.97	8,735.89	60,559.86
Williston pumping station No. 4	2,935.67	131.00	3,066.67	9,234.50	948.30	10,182.80
Buford pumping station No. 1	.....	.....	.....	22,912.84	3,521.38	26,434.22
Buford pumping station No. 2	.....	243.88	243.88	26,655.32	6,559.56	33,214.88
Williston power house	.....	.....	.....	89,550.96	26,221.08	115,772.04
Williston transmission line	.....	183.80	183.80	633.12	2,091.78	2,724.90
Buford transmission line	.....	.....	.....	3,047.23	1,892.38	4,939.61
Damage claims	.....	125.00	125.00	.....	125.00	125.00
Engineering and inspection	.....	992.08	992.08	.....	992.08	992.08
General expense	.....	5,438.85	5,438.85	.....	5,438.85	5,438.85
Total pumping for irrigation	34,655.85	9,548.13	44,203.98	235,622.37	58,675.59	294,297.96
Lateral system:						
Williston Division	2,885.35	3,339.80	6,225.15	22,167.96	20,860.67	43,028.63
Buford Division	.....	.....	.....	7,100.90	1,528.77	8,629.67
Total lateral system	2,885.35	3,339.80	6,225.15	29,268.86	22,389.44	51,658.30

Operation and maintenance cost and revenues for calendar year 1920 and total to Dec. 31, 1920—Continued.

Features.	Calendar year 1920.			To end of calendar year.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS—continued.						
Telephone system:						
Williston Division		$12.75	$12.75	$583.13	$449.50	$1,032.63
Buford Division				1,087.27	155.13	1,242.40
Total telephone system		12.75	12.75	1,670.40	604.63	2,275.03
Permanent improvements and lands, buildings		2,804.83	2,804.83		9,765.84	9,765.84
Commercial power:						
Preparatory				9,330.54		9,330.54
Costs	$25,609.46		25,609.46	25,609.46		25,609.46
Total commercial power	25,609.46		25,609.46	34,940.00		34,940.00
Subtotal	63,150.66	15,705.51	78,856.17	301,501.63	91,435.50	392,937.13
Less unpaid operation and maintenance charges added to construction						22,191.93
						370,745.20
REVENUES.						
Operation and maintenance repayments under contract with water users:						
Forfeitures			[1] 217.87			
Charges due			17,327.86			48,325.27
Interest and penalties			21.67			67.08
Rentals of irrigation water						2,751.83
Other revenues, unclassified, earned during operating period			25,415.26			26,996.76
Total			42,546.92			78,140.94
Deficit			36,309.25			292,604.26

[1] Contra.

Operation and maintenance costs, by calendar years, North Dakota pumping project.

Year ended Dec. 31—	Construction.			Operation and maintenance.			Total construction and operation and maintenance.
	Original.	Operation and maintenance added.	Total.	Total.	Less operation and maintenance added.	Net.	
1907	$394,601.04		$394,601.04				$394,601.04
1908	202,774.81		202,774.81	$34,444.47		$34,444.47	237,219.28
1909	69,221.31		69,221.31	45,106.43		45,106.43	114,327.74
1910	12,432.17		12,432.17	40,579.20		40,579.20	53,011.37
1911	5,392.45		5,392.45	33,899.83		33,899.83	39,292.28
1912	[1] 988.70		[1] 988.70	47,405.78		47,405.78	46,417.08
1913	294.70		294.70	45,589.03		45,589.03	45,883.73
1914				49,654.80		49,654.80	49,654.80
1915	4,536.84	$22,191.93	26,728.77	25,358.48	$22,191.93	3,166.55	29,895.32
1916				26,014.45		26,014.45	26,014.45
1917	29.75		29.75	[1] 84,555.18		[1] 84,555.18	[1] 84,525.43
1918	2,061.58		2,061.58	6,317.51		6,317.51	8,379.09
1919	4,582.69		4,582.69	44,266.16		44,266.16	48,848.85
1920	364.25		364.25	78,856.17		78,856.17	79,220.42
1921		[1] 20,887.66	[1] 20,887.66	257,868.26	[1] 20,887.66	278,755.92	257,868.26
Total	695,302.89	1,304.27	696,607.16	650,805.39	1,304.27	649,501.12	1,346,108.28

[1] Contra.

Operation and maintenance cost, by fiscal years, North Dakota pumping project.

Year ending June 30—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Total.	Less operation and maintenance added.	Net.	
1907	$177,963.96		$177,963.96				$177,963.96
1908	352,426.30		352,426.30				352,426.30
1909	128,193.39		128,193.39	$55,133.54		$55,133.54	183,326.93
1910	12,402.55		12,402.55	41,629.23		41,629.23	54,031.78
1911	9,354.13		9,354.13	36,326.47		36,326.47	45,680.60
1912	4,403.75		4,403.75	35,141.17		35,141.17	39,544.92
1913				48,439.46		48,439.46	48,439.46
1914	294.70		294.70	28,381.56		28,381.56	28,676.26
1915		$22,191.93	22,191.93	20,571.32	$22,191.93	[1] 1,620.61	20,571.32
1916	4,536.84		4,536.84	[1] 2,351.05		[1] 2,351.05	2,185.79
1917				522.31		522.31	522.31
1918				1,738.68		1,738.68	1,738.68
1919	5,105.62		5,105.62	23,729.66		23,729.66	28,835.28
1920	257.40		257.40	51,276.54		51,276.54	51,533.94
1921	364.25	[1] 20,887.66	[1] 20,523.41	310,266.50	[1] 20,887.66	331,154.16	310,630.75
Total	695,302.89	1,304.27	696,607.16	650,805.39	1,304.27	649,501.12	1,346,108.28

[1] Contra.

Statement of general expense for fiscal year 1921 and total to June 30, 1921, North Dakota pumping project.

Office.	Fiscal year 1921.			From Jan. 1, 1917, to June 30, 1921.		Total.
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	
Washington office		$2,361.54	$2,361.54		$7,656.93	$7,656.93
Project office		9,137.25	9,137.25		27,226.25	27,226.25
Denver office		1,145.05	1,145.05		4,466.86	4,466.86
District counsel's office		284.28	284.28		1,829.99	1,829.99
Other offices and miscellaneous		35.73	35.73		2,369.13	2,369.13
Total to Jan. 1, 1917, not subdivided				$43,101.63	21,421.34	64,522.97
Total		12,963.85	12,963.85	43,101.63	64,970.50	108,072.13
Percentage of general expense to gross cost		14	14	6.2	10	8

OREGON, UMATILLA PROJECT.

H. M. Schilling, project manager, Hermiston, Oreg.

LOCATION.

Counties: Umatilla and Morrow.

Townships: 4 and 5 N., Rs. 24, 25, 26, 27, 28, and 29 E., Willamette meridian.

Railroads: Oregon-Washington Railroad & Navigation Co.; Spokane, Portland & Seattle R. R.

Project cities and towns and estimated population June 30, 1921: Hermiston, 725; Umatilla, 300; Irrigon, 75; Boardman, 100.

WATER SUPPLY.

Source of water supply: Umatilla River.

Area of drainage basin: 2,160 square miles.

Annual run-off in acre-feet: Umatilla River at Yoakum (1,200 square miles), 1903 to 1920, maximum, 746,000; minimum, 250,000; mean, 520,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which Service is prepared to supply water, season of 1921: 24,395 acres.

Area under water-right applications, season of 1921: 24,392 acres.

Length of irrigation season: From March 20 to October 16—210 days.

Average elevation of irrigable area: 470 feet above sea level.

Rainfall on irrigable area: Average for 14 years, 7.94 inches.

Average of highest recorded temperature for 14 years, 105° F.; average of lowest recorded temperature for 14 years, −7° F.

Character of soil, irrigable area: Sandy loam.

Principal products: Alfalfa, fruits, berries, vegetables, honey, and dairy produce.

Principal markets: Portland, Oreg.; Spokane and Seattle, Wash., and eastern points.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 27, 1907; August 3 and November 12, 1908; April 3, 1909; January 6, 1910 (two); February 28 and May 16, 1911; March 2, and May 8, 1912; March 3, April 7, June 23, July 15, and July 21, 1913; January 19 and September 24, 1914; February 25, April 5, and December 12, 1915 (two); March 16, April 12 (three), May 12, May 27, September 21, December 18, 1916; January 2, January 5, February 8, February 23, March 23, April 20, April 23, and December 11, 1917; January 2, January 26, January 30, February 6, February 7, February 16, March 8, April 3, July 16, and November 25, 1918; March 12, May 24, and June 27, 1919; March 26, April 3, November 4, and December 4, 1920; April 25, 1921.

Location of lands opened: Ts. 4 and 5 N., Rs. 24, 25, 26, 27, 28, and 29 E., Willamette meridian.

Limit of area of farm units: Public, 40 acres; private, 160 acres.

Duty of water: Beneficial use.

Building charge per acre of irrigable land: $60, $70, and $92.

Annual operation and maintenance charge: Minimum charge, 1920, East Division, $2.75 per acre; West Division, $2 per acre. Minimum charge, 1921, East Division, $2.25 per acre; West Division, $2 per acre.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers October 27, 1905.

Construction authorized by Secretary December 4, 1905.

Diversion dam and feed canal completed August, 1907.

Cold Springs Dam completed June, 1908.

First irrigation by Reclamation Service, season of 1908.

Construction of West Division authorized December 22, 1913.

West Division (Three Mile Falls) Diversion Dam completed November 28, 1914.

West Division Main Canal completed June, 1916.

Entire project (including West Division) 96.9 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Umatilla project provides for the diversion of water from the Umatilla River above Echo, Oreg., through a feed canal 24.5 miles long, into a storage reservoir. Water is diverted from the reservoir through an outlet canal, also from the feed canal by means of a by-pass connecting the feed and outlet canals. Water is also diverted from the Umatilla River by the Maxwell Canal, heading near Butter Creek, and delivered into a distribution system from the reservoir, thus watering land in the Umatilla and Columbia River Valleys near Hermiston, Oreg. In addition some 11,300 acres bordering the Columbia River in the vicinity of Umatilla, Irrigon, and Boardman, Oreg., will be watered by a canal diverting from the Umatilla River about halfway between Hermiston and Umatilla.

The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating water arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law, heretofore made, for the purpose of the project.

The features which have been completed are the diversion works above Echo, feed canal, Cold Springs Dam, by-pass, diversion works for the Maxwell Canal, Three Mile Falls Diversion Dam, main distributary from Cold Springs Reservoir, main distributary for the West Division, and laterals for the irrigable area now opened. Four drain ditches have been built. The main construction work in progress is the building of laterals in the West Division the lining with concrete of portions of the A Canal on the East Side division, and supplemental construction in order to deliver water to the most commanding point on each 40-acre subdivision of the East Side lands.

SUMMARY OF GENERAL DATA FOR UMATILLA PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		28,300
Public land entered to June 30, 1921	5,356	
Public land open to entry on June 30, 1921	79	
Public land withdrawn on June 30, 1921	2,376	
Railroad land unsold, June 30, 1921	3,319	
Other private land, June 30, 1921	17,170	
Acreage Service could have supplied in season of 1920		24,395
Estimated acreage Service can supply in season 1921		24,395
Estimated acreage Service can supply in season 1922		24,395
Acreage irrigated season of 1920		12,030
Acreage cropped under irrigation season of 1920		10,190
Crops:		
Value of irrigated crops season of 1920		$519,470.00
Value of irrigated crops per acre cropped		50.00
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$170,000.00	
Miscellaneous collections and transfers issued	11,697.76	
Increase of compensation	10,951.12	
Total amount authorized		$192,648.88
Encumbrances—		
Disbursements and transfers received	147,167.28	
Current liabilities	11,040.91	
Contingent liabilities	164.84	
Increase of compensation	10,951.12	
Total encumbrances		169,324.15
Unencumbered balance July 1, 1921		23,324.73
Fiscal year 1922—		
Amount specified in appropriation act		467,000.00
Fiscal year 1923—		
Proposed appropriation		500,000.00
Inventories:		
Value of stock on hand		10,867.61
Value of plant and equipment in use		10,675.47
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$2,597,308.31	
Less revenues and adjustments	19,646.96	
Net cost to June 30, 1921		2,577,661.35
Per cent completed on June 30, 1921	96.9	
Estimated per cent completed on June 30, 1922	97.5	
Estimated per cent completed on June 30, 1923	98.0	
Value of construction water-right contracts and other resources to repay net cost of project		1,670,096.47
Revenues held in reserve		13,725.65

Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$424,918.02	
Less charges due and miscellaneous revenues	280,939.60	
Deficit		$115,786.45

Drainage:	
Total cost of drainage works to June 30, 1921	$54,812.63
Miles of open drains built to June 30, 1921	10
Estimated acreage damaged by seepage on June 30, 1921	300
Estimated acreage protected by drains on June 30, 1921	2,000
Estimated acreage to be protected by authorized system	2,000

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Discount.	Total.	
Construction charges	$337,467.42	$294,413.67	.....	$294,413.67	$43,053.75
Operation and maintenance charges (public notice)	243,465.42	189,242.51	$3,265.07	192,507.58	50,957.84
Rentals, irrigation water	28,112.04	27,664.22	.....	27,664.22	447.82
Rentals, grazing and farming lands	702.05	627.05	.....	627.05	75.00
Contractors' freight refunds	1,055.31	1,055.31	.....	1,055.31	.....
Miscellaneous	23,838.56	22,684.71	.....	22,684.71	1,153.85
Total	634,640.80	535,687.47	3,265.07	538,952.54	9,568.26

CONSTRUCTION DURING FISCAL YEAR.

East Division.—The principal construction work in progress was the continuation of the improvement of A Canal, the main distributary from Cold Springs Reservoir. As the canal is operated continuously during the irrigation season this work could be prosecuted only during the late fall and early spring. About 12,000 cubic yards of material were excavated and 3,200 cubic yards of concrete placed. Two and one-fourth miles of canal were lined.

In six supplemental construction districts 4,468 linear feet of 12-inch, 16-inch, and 20-inch concrete pipe were laid, 29 minor structures were constructed, 5,950 linear feet of small lateral were lined with concrete, 1,790 cubic yards of class 1 material were excavated, and 6,474 linear feet of 12-inch, 4,158 linear feet of 16-inch, and 3,360 linear feet of 20-inch concrete pipe were manufactured.

West Division.—On 13 laterals 7,401 linear feet of 12-inch, 15-inch, 16-inch, and 18-inch concrete pipe were laid, 14 minor structures were constructed, and 1,804 linear feet of small lateral were lined with concrete.

SEEPAGE AND DRAINAGE.

There was no change in seepage conditions in the East Division, the area damaged remaining at about 300 acres. In the Boardman section of the West Division a number of shallow open drains were constructed by the owners of the lands affected, which in some instances have given considerable relief.

OPERATION AND MAINTENANCE.

East Side Division—Diversions by the Feed Canal for storage were from October 19 to June 8. An early run-off in the Umatilla River made possible the earliest operation of the canal of record. Favorable water-supply conditions and absence of ice difficulties

resulted in a continuous run and an early filling of Cold Springs Reservoir. The maximum storage of 49,700 acre-feet was reached on February 15. Diversions by the Feed Canal totaled 88,619 acre-feet, of which 761 acre-feet were wasted, 12,721 acre-feet delivered under the Cuhna contract, 408 acre-feet delivered to water users, and 66,783 acre-feet delivered to Cold Springs Reservoir. Available storage on June 30, 1921, was 36,800 acre-feet.

Delivery of water to the distribution system began March 19. The total discharge from the reservoir for the year was 60,221 acre-feet. The total diversions by the Maxwell Canal for the year were 18,036 acre-feet. Approximately 40,000 acre-feet were delivered to farms. The irrigable area of holdings on that portion of the project east of the Umatilla River is estimated to be 13,000 acres, and the area actually irrigated approximately 9,000 acres.

West Extension.—Diversions of water by the West Extension Main Canal were from July 1 to October 31, 1920, and from March 17 to June 30, 1921. The irrigation season of 1920 ended October 31. The irrigation season of 1921 began March 17. Approximately 45,000 acre-feet were diverted during the year, of which approximately 15,000 acre-feet were delivered to farms. About 3,500 acres have been irrigated.

Historical review, Umatilla project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Area for which Service was prepared to supply water	16,000	19,000	24,247	24,300	24,300	24,395
Miles of canal operated	112	163	165	177	177	177
Acreage irrigated	5,300	5,900	7,327	9,100	10,533	12,030
Water diverted (acre-feet)	86,200	93,000	99,900	118,154	162,850	165,534
Water delivered to land (acre-feet)	29,550	34,380	45,365	48,163	53,500	50,651
Per acre of land irrigated (acre-feet)	5.57	5.83	6.19	5.61	5.1	4.21

SETTLEMENT.

The population of the project in 1920 was approximately 2,750, a little more than half living on farms and the remainder in the four project towns of Hermiston, Umatilla, Irrigon, and Boardman.

Settlement data, Umatilla project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	745	800	869	875	1,000
Population	975	1,024	1,127	1,200	1,472
Number of irrigated farms	364	411	459	500	528
Operated by owners or managers	216	302	339	350	450
Operated by tenants	148	109	120	150	78
Population	975	1,024	1,200	1,200	1,280
Number of towns	4	4	4	4	4
Population	1,225	1,100	1,200	1,200	1,230
Population in towns and on farms	2,200	2,124	2,327	2,400	2,702
Number of schools, public	6	6	6	6	6
Number of churches	9	9	9	9	9
Number of banks	1	1	1	1	1
Total capital stock	$25,000	$25,000	$25,000	$25,000	$25,000
Amount of deposits	$99,000	$157,000	$170,000	$232,000	$317,590
Number of depositors	845	960	1,000	1,129	1,200

PRINCIPAL CROPS.

During 1920 approximately 12,000 acres were irrigated and 10,200 acres cropped, the difference being mainly areas in new seedings of alfalfa. The total value of crops was $519,470, as compared with $633,380 during 1919. The decrease was due to the marked fall in prices of all farm products.

The agricultural situation for 1921 is not promising. The project has been operating on a one-crop basis (alfalfa), and the resources necessary for changing to diversified farming are lacking. In so far as the settler can readjust his type of farming to meet the discouraging economic conditions he will succeed.

Crop report, Umatilla project, Oregon, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	8,512	Ton	32,110	3.7	$13.71	$440,230	$51.72
Alfalfa seed	34	Bushel	106	3	21.52	2,282	67.12
Apples	652	Pound	374,690	575	.041	15,362	23.56
Barley	8	Bushel	350	44	1.16	406	50.75
Corn (Indian)	124	...do	3,740	30	1.34	5,012	40.42
Corn fodder	100	Ton	601	6	6.42	3,858	38.58
Fruits, small	30					2,843	94.77
Garden	143					22,120	154.69
Hay	335	Ton	335	1	11.81	3,956	11.85
Pasture	422					12,722	30.15
Peaches	50	Pounds	Failure				
Pears	7	...do	...do				
Prunes	2	...do	6,660	3,330	.05	333	166.50
Potatoes	48	Bushel	4,203	88	2.03	8,532	177.75
Rye	10	...do	110	11	1.60	176	17.60
Wheat	20	...do	240	12	2.20	528	26.40
Miscellaneous	33					1,110	33.64
Less duplicated area	340						
Total cropped	10,190	Total and average				519,470	50.00
Irrigated, no crop:							
Nonbearing orchard	104						
Young alfalfa	1,523						
Miscellaneous	350						
Less duplicated areas	137						
Total irrigated	12,030						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	18,568	528	66.1
Total irrigated area farms reported	12,030	528	42.8
Irrigated under water-right applications	10,528	[2] 449	37.5
Irrigated under rental contracts	179	[2] 7	.6
Miscellaneous	[1] 132	[2] 82	4.7
Total cropped area farms reported	10,190	528	36.3

[1] Vested water right, 108 acres; departmental regulations, 51.5 acres.
[2] 10 farms duplicated. Maxwell rental contracts, 405.75 acres; sandy area rental, 757.2 acres.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, NOVEMBER 4, 1920.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof, or supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), a majority of the water-right applicants and owners of the lands included in District No. 34 of the Umatilla project, Oregon, have made agreements providing for an increase in the cost of construction in

the sum of $40 per irrigable acre. This increased cost is for the concrete lining of what is known as the "DH" lateral for approximately 300 linear feet, and the relocation and construction of said lateral for approximately 970 linear feet; also the construction of 1,350 linear feet of new lateral from the "D" canal, in order that water may be delivered as near as practicable to the commanding points of the various units in said district, all of which supplemental construction will involve a cost of not to exceed $40 per acre of irrigable land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed and the said increase in the construction charge of $40 per irrigable acre is hereby made effective in accordance with the conditions of the said agreements and as herein specified.

3. **Lands affected.**—The lands in the district, all of which are subject to said increased charge, are described as follows:

Township 4 N., Range 28 E., W. M.:
Sec. 3, SW. ¼ NW. ¼ SW. ¼; W. ½ SW. ¼ SW. ¼.
Sec. 9, S. ½ NE. ¼ NE. ¼; S. ½ SE. ¼ NW. ¼ NE. ¼; N. ½ SE. ¼ NE. ¼.
Sec. 10, NW. ¼ NW. ¼; N. ½ SW. ¼ NW. ¼.

4. **Payment of increased charge.**—Such increased charge of $40 per irrigable acre shall be added to the construction charge against the land in question and be paid in additional annual installments after the last of the installments of the present construction charge, being eight annual installments of $5 per irrigable acre each.

JOHN BARTON PAYNE,
Secretary of the Interior.

PUBLIC NOTICE, DECEMBER 4, 1920.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof, or supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), a majority of the water-right applicants and owners of the land included in District No. 31 of the Umatilla project, Oregon, have made agreements providing for an increase in the cost of construction in the sum of $32.50 per irrigable acre. This increased cost is for the construction of a distributary consisting of about 710 feet of 20-inch, 1,330 feet of 16-inch, and 1,460 feet of 12-inch cement pipe, with necessary turnouts, whereby the water may be delivered as near as practicable to the commanding points of the various units in said district, all of which supplemental construction will involve a cost of not to exceed $32.50 per acre of irrigable land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed and the said increase in the construction charge of $32.50 per irrigable acre is hereby made effective in accordance with the conditions of the said agreements and as herein specified.

3. **Lands affected.**—The lands of the district, all of which are subject to said increased charge, are described as follows:

Township 5 N., Range 29 E., W. M.:
Sec. 33, N. ½ NE. ¼; SE. ¼ NE. ¼; E. ½ SW. ¼ NE. ¼.

4. **Payment of increased charge.**—Such increased charge of $32.50 per irrigable acre shall be added to the construction charge against the land in question and be paid in additional annual installments

after the rest of the installments of the present construction charge, being five annual installments of $5 per irrigable acre each and one installment of $7.50 per irrigable acre.

JOHN BARTON PAYNE,
Secretary of the Interior.

PUBLIC NOTICE, APRIL 25, 1921.

1. **East Division.**—The annual operation and maintenance charges for the irrigation season of 1921 and thereafter until further notice, against all lands of the East Division, heretofore called East Side unit, Umatilla project, Oregon, under public notice shall be as follows: A minimum charge of $2.25 per irrigable acre, whether water is used thereon or not, which minimum charge will entitle the water user to 4 acre-feet of water per irrigable acre: *Provided*, That for lands in the so-called sandy area, this charge will entitle the water user to 7 acre-feet of water per irrigable acre. Additional supplies will be furnished for all lands at the following rates: The first acre-foot for 75 cents and each acre-foot thereafter for $1: *Provided further*, That for lands seeded during the current irrigation season to alfalfa for the first time, the additional supply of water will be furnished for 25 cents per acre-foot.

2. **West Division.**—The annual operation and maintenance charges for the irrigation season of 1921 and thereafter until further notice, against all lands of the West Division, heretofore called West Extension unit, Umatilla project, Oregon, under public notice shall be as follows: A minimum charge of $2 per irrigable acre, whether water is used thereon or not. For lands in the Boardman and Kern Districts of the West Division (excepting lands in the Juniper Canyon area) this charge will entitle the water user to 3 acre-feet of water per irrigable acre. For the remaining lands in the West Division, including lands in the Juniper Canyon area, this charge will entitle the water user to 4½ acre-feet of water per irrigable acre. Additional supplies will be furnished for all lands at the following rates: The first acre-foot for 75 cents, and each acre-foot thereafter for $1: *Provided*, That for lands seeded during the current irrigation season to alfalfa for the first time, the additional supply of water will be furnished for 25 cents per acre-foot.

3. **Payment of charges.**—All operation and maintenance charges under the project will be due and payable on March 1 following the irrigation season, but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which water-right application is made.

ALBERT B. FALL,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Umatilla project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$626.61
Inventory of materials and supplies on hand			10,867.61
Plant and equipment in use			10,675.47
Current accounts receivable			95,688.26
Construction charges not due			1,311,122.29
Unearned value of contracts			164.84
Construction cost of works		$2,524,025.86	
Operation and maintenance added to construction		72,954.03	
Unadjusted clearing accounts		328.42	
Gross construction cost		2,597,308.31	
Less revenues and adjustments during construction period		19,646.96	
Net construction cost			2,577,661.35
Operation and maintenance cost under public notice	$497,872.05		
Less operation and maintenance added to construction	72,954.03		
Gross operation and maintenance cost		424,918.02	
Less revenues and adjustments		280,939.60	
Deficit to Dec. 31, 1920	115,786.45		
Net cost Jan. 1 to June 30, 1921	28,191.97		
			143,978.42
Investment items in transit			1,148.56
Total debits			4,151,933.41

CREDITS.

Current accounts payable			$11,301.32
Contingent and deferred liabilities			791.45
Resources for repaying cost of project			1,670,096.47
Revenues held in reserve			13,725.65
Investment:			
Disbursements and transfers from other projects	$3,248,766.88		
Items in transit	1,168.13		
Total		$3,249,935.01	
Less collections and transfers to other projects	793,896.92		
Items in transit	19.57		
Total		793,916.49	
Net investment			2,456,018.52
Total credits			4,151,933.41

Construction cost and revenue, Umatilla project.

Features.	Fical year 1920.	To June 30, 1921..
Examination and surveys:		
East Division	$3,765.25	$63,014.11
West Division		64,476.71
	3,765.25	127,490.82
Storage works, East Division:		
Diversion Dam and works		33,284.92
Feed Canal		341,410.56
Cold Springs Dam and works		464,644.11
		839,339.59
Canal system:		
East Division—		
Canal A		45,477.85
Canal A enlargement	68,207.15	91,178.64
Maxwell Diversion Dam and works		4,569.04
Maxwell Canal		37,684.83
West Division—		
Three Mile Falls Dam and works		73,586.05
Main Canal	3,168.95	490,592.26
	71,376.10	743,088.67

Construction cost and revenue, Umatilla project—Continued.

Features.	Fiscal year 1920.	To June 30, 1921.
Lateral system:		
East Division—		
Supplemental construction	$27,364.10	$83,967.09
Laterals	.....	428,931.55
West Division—		
Supplemental construction	1,711.23	1,711,23
Laterals	12,446.96	205,146.78
	41,522.29	719,756.65
Drainage systm:		
East Division—		
Umatilla Drain	.....	6,022.69
Hermiston Drain	.....	44,010.69
Second Unit Drain	.....	3,174.60
Hat Rock Drain	.....	1,604.65
	.....	54,812.63
Farm units:		
East Division	50.29	2,027.04
West Division	[1] 50.29	1,348.04
	.....	3,375.08
Permanent improvements:		
East Division—		
Frame building, Hermiston	.....	8,496.12
Office building, Hermiston	.....	6,454.70
Feed Canal quarters	.....	1,769.96
Cold Springs Dam buildings	.....	3,573.39
Demonstration farm buildings	.....	3,421.47
West Division—		
Warehouse at Irrigon	.....	917.21
Boardman quarters	.....	3,523.82
Three Mile Falls quarters	.....	4,287.72
Garage and equipment shed	719.85	945.46
	719.85	33,389.85
Telephone system, West Division	.....	2,772.57
Total cost, construction features	117,383.49	2,524,025.86
Unadjusted clearing	328.42	328.42
Operation and maintenance added to construction	2,037.61	72,954.03
Gross construction cost	119,749.52	2,597,308.31
Less revenues earned during construction period:		
Rentals of buildings	632.00	7,484.86
Rentals of irrigation water	.....	80.00
Contractors' freight refunds	.....	1,055.31
Revenues unclassified	972.03	11,260.10
Loss on hospital operations	677.02	[1] 49.44
Doubtful accounts	[1] 183.87	[1] 183.87
	2,097.18	19,646.96
Net construction cost to June 30, 1921	117,652.34	2,577,661.35

[1] Contra.

Operation and maintenance cost and revenue, Umatilla project.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COST.						
Storage works	$3,864.71	$2,822.32	$6,687.03	$61,630.52	$49,667.20	$111,297.72
Canal system	3,396.77	3,366.41	6,763.18	14,382.64	16,024.00	30,406.64
Lateral system:						
East Division	4,330.64	5,892.93	10,223.57	63,820.47	136,515.62	200,336.09
West Division	2,206.17	2,988.27	5,194.44	8,964.92	15,046.07	24,010.99
Total lateral	6,536.81	8,881.20	15,418.01	72,785.39	151,561.69	224,347.08
Drainage, East Division		1,407.45	1,407.45		12,134.48	12,134.48
Sluicing, West Division		3,018.67	3,018.67		31,065.11	31,065.11
Undistributed expenses: Hydrometry, damage claims, and general expense	7,394.67	5,627.78	13,022.45	26,745.01	26,155.90	52,900.91
Permanent improvements		1,747.74	1,747.74		7,528.14	7,528.14
Subtotal	21,192.96	26,871.57	48,064.53	175,543.56	294,136.52	469,680.08
Less unpaid operation and maintenance added to construction			156.52			72,954.03
Total			47,908.01			396,726.05
REVENUES.						
Operation and maintenance repayments under contracts with water users:						
Charges due			45,900.57			243,465.42
Payments advanced			1,498.98			1,498.98
Interest and penalties			2,025.60			6,134.20
Water rentals			5,779.99			28,032.04
Other revenues (unclassified)			2,452.11			5,074.03
Discounts			[1] 1,477.98			[1] 3,265.07
Total revenues and adjustments			56,179.27			280,939.60
Differences:						
Deficit						115,786.45
Excess			8,271.26			

[1] Contra.

Cost, by calendar years, Umatilla project.

Year ending Dec. 31—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1907	$628,021.43		$628,021.43				$628,021.43
1908	342,724.04		342,724.04	$21,533.97		$21,533.97	364,258.01
1909	110,049.68		110,049.68	27,209.09		27,209.09	137,258.77
1910	81,557.21		81,557.21	30,724.15		30,724.15	112,281.36
1911	134,764.17		134,764.17	30,538.32		30,538.32	165,302.49
1912	93,190.64		93,190.64	27,140.45		27,140.45	120,331.09
1913	71,021.46		71,021.46	32,737.93		32,737.93	103,759.39
1914	314,071.70		314,071.70	26,334.68		26,334.68	340,406.38
1915	299,696.13	$19,323.98	319,020.11	24,704.45	$19,323.98	5,380.47	324,400.58
1916	187,294.25	7,805.91	195,100.16	28,601.92	7,805.91	20,796.01	215,896.17
1917	69,480.49	5,237.17	74,717.66	42,178.08	5,237.17	36,940.91	111,658.57
1918	23,781.79	27,537.70	51,319.49	71,716.10	27,537.70	44,178.40	95,497.89
1919	25,698.63	10,855.14	36,553.77	58,196.41	10,855.14	47,341.27	83,895.04
1920	88,151.10	2,194.13	90,345.23	48,064.53	2,194.13	45,870.40	136,215.63
Jan. 1 to June 30, 1921	54,851.56		54,851.56	28,191.97		28,191.97	83,043.53
Total	2,524,354.28	72,954.03	2,597,308.31	497,872.05	72,954.03	424,918.02	3,022,226.33

Cost, by fiscal years, Umatilla project.

Year ending June 30—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1908	$882,041.86	.....	$882,041.86	$8,593.98	.....	$8,593.98	$890,635.84
1909	128,965.20	.....	128,965.20	26,484.38	.....	26,484.38	155,449.58
1910	116,039.24	.....	116,039.24	26,546.55	.....	26,546.55	142,585.79
1911	105,634.29	.....	105,634.29	33,554.23	.....	33,554.23	139,188.52
1912	113,636.13	.....	113,636.13	28,444.26	.....	28,444.26	142,080.39
1913	88,061.26	.....	88,061.26	29,822.46	.....	29,822.46	117,883.72
1914	102,389.31	.....	102,389.31	30,981.80	.....	30,981.80	133,371.11
1915	363,622.67	$19,323.98	382,946.65	25,817.38	$19,323.98	6,493.40	389,440.05
1916	247,938.43	123.80	248,062.23	23,842.94	123.80	23,719.14	271,781.37
1917	171,600.43	7,647.08	179,247.51	35,637.59	7,647.08	27,990.51	207,238.02
1918	27,739.52	5,228.72	32,968.24	51,013.71	5,228.72	45,784.99	78,753.23
1919	28,322.97	27,153.25	55,476.22	77,604.39	27,153.25	50,451.14	105,927.36
1920	30,651.06	11,439.59	42,090.65	52,639.88	11,439.59	41,200.29	83,290.94
1921	117,711.91	2,037.61	119,749.52	46,888.50	2,037.61	44,850.89	164,600.41
Total	2,524,354.28	72,954.03	2,597,308.31	497,872.05	72,954.03	424,918.02	3,022,226.33

General expense, Umatilla project.

Office.	Fiscal year 1920.			From Mar. 1, 1917, to June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$2,037.10	$1,633.26	$3,670.36	$7,155.60	$6,740.60	$13,896.20
Project office	6,250.57	4,698.63	10,949.20	23,331.50	25,466.50	48,798.00
Denver Office	1,106.00	884.84	1,990.84	3,862.77	4,215.55	8,078.32
District counsel's office	897.50	717.94	1,615.44	4,041.23	4,747.95	8,789.18
Prior to Mar. 1, 1917	.....	.....	.....	265,514.37	35,479.83	300,994.20
Total	10,291.17	7,934.67	18,225.84	303,905.47	76,650.43	380,555.90
Percentage of general expense to gross cost	8.7	16.9	11.1	12	15.4	12.6

OREGON-CALIFORNIA, KLAMATH PROJECT.

HERBERT D. NEWELL, project manager, Klamath Falls, Oreg.

LOCATION.

Counties: Klamath, Oreg.; Siskiyou and Modoc, Calif.

Townships: 38 to 41 S., Rs. 8 to 14 E., Willamette meridian; 46 to 48 N., Rs. 1 to 8 E., Mount Diablo meridian.

Railroads: California Northeastern; Oregon-California and Eastern.

Project cities and towns and estimated population June 30, 1921, Klamath Falls, 5,000; Midland, 50; Olene, 50; Merrill, 300; and Malin, 100.

WATER SUPPLY.

Source of water supply: Upper Klamath Lake, Lost River, and Clear Lake.

Area of drainage basin: 3,700 square miles.

Annual run-off in acre-feet, 1904 to 1920: Link River at Klamath Falls (3,110 square miles)—Maximum, 2,100,000; minimum, 1,002,000; mean, 1,544,000. Lost River and Willow Creek at Clear Lake, Calif. (550 square miles)—Maximum, 254,000; minimum 25,000; mean, 119,000. Miller Creek at Lorella, Oreg. (270 square miles)—Maximum, 126,400; minimum, 20,600; mean, 58,200. Lost River at Olene, Oreg., 1904 to 1911 (1,290 square miles)—Maximum, 473,500; minimum, 128,000; mean, 263,000. Lost River at Wilson's Bridge, Oreg., 1912 to 1920; Maximum, 121,000; minimum, 5,100; mean, 50,400.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1921, 51,000 acres.

Area under water-right applications, season of 1921, 42,603 acres.

Area under special contract, season of 1921, 8,400 acres.

Length of irrigation season: From April 15 to September 30—168 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Average annual rainfall on irrigable area, 12 years: 12.7 inches.

Average of recorded temperatures, 12 years: Highest, 97° F.; lowest, −4° F.

Character of soil of irrigable area: Disintegrated basalt, volcanic ash, and diatomaceous earth, being largely classified as Yakima sandy loam.

Principal products: Alfalfa, hay, grain, and vegetables; stock, poultry, and dairy products.

Principal markets: Portland, Oreg.; Sacramento and San Francisco, Calif.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: November 18 and December 7, 1908; August 24, 1909; June 9, 1910; March 23 and September 24, 1914; March 26 and September 15, 1915; March 9 and 16, 1916; February 12, March 9 and 31, 1917; March 13, 1918; February 25, 1920.

Location of lands opened: T. 38 S., R. 9 E.; 39 S., Rs. 8 to 11½ E.; 40 S., Rs. 9 to 11 E.; 41 S., Rs. 10 to 12 E., Willamette meridian, and 48 N., R. 5 E., Mount Diablo meridian.

Limit of area of farm units: 160 acres.

Duty of water, 1.8 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land, $30 for the first and second units, $39 and $45 for the third unit.

Annual operation and maintenance charge, season of 1920, minimum charge $2 per acre for 2 acre-feet, 50 cents for first additional acre-foot, and 75 cents per acre-foot thereafter.

CHRONOLOGICAL SUMMARY.

Reconnoissance made in October and November, 1903.

Preliminary surveys begun in 1904.

Construction recommended by a board of engineers May 1, 1905.

Construction authorized by Secretary May 15, 1905.
Main Canal completed August, 1907.
First irrigation by Reclamation Service season of 1907.
Keno Canal completed October, 1908.
South Branch Canal completed March, 1909.
Clear Lake Dam completed January, 1910.
Lost River Diversion Dam completed June, 1912.
Adams Canal enlargement begun October, 1913, completed April, 1914.
Second unit lateral system begun October, 1912, completed June, 1915.
G Canal (enlargement of Griffith Lateral) begun March 8, 1915, completed April 30, 1915.
Construction of C-G Canal begun May, 1921.
Construction of J Canal begun June, 1921.
Concrete lining on C Canal completed May, 1921.
Construction of precast concrete flume on C Canal begun April, 1921.
Lateral, margin of Tule Lake, begun June 5, 1916, completed June 30, 1917.
Entire project 57 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Klamath project provides for the storage of water in Upper Klamath Lake, lying just north of Klamath Falls, Oreg. Water for irrigation is diverted into the Main (A) Canal from the east side of Link River, about 700 feet south of the lake. Link River is the outlet of Upper Klamath Lake and connects with the Klamath River, which flows into the Pacific Ocean. A short distance below the point of diversion on Link River the Main Canal passes under the city of Klamath Falls by means of a concrete-lined tunnel 3,300 feet in length. The Main Canal extends in a southeasterly direction for a distance of about 9 miles, supplying project canals and laterals. The Griffith (G) Canal diverts from Lost River at the Lost River diversion dam, the latter being about 10 miles southeast of Klamath Falls. The G Canal mainly serves Tule Lake lands and a strip along the easterly side of Lost River.

An important feature of the Klamath project is the reclamation of the bed of Tule Lake, which is being brought about by evaporation and by preventing inflow. Tule Lake has no visible outlet and is located partly in Oregon and partly in California. The works which have been constructed to accomplish this purpose consist of the Clear Lake Reservoir and the Lost River diversion canal. Clear Lake Reservoir is located at the head of Lost River and was constructed for the purpose of preventing the run-off from the water shed above from entering Tule Lake. Clear Lake is, in effect, an evaporating basin covering an area of about 25,000 acres, a large quantity of water being disposed of each year by evaporation. In addition to aiding in the work of reclaiming Tule Lake, Clear Lake storage can be utilized to irrigate about 12,000 acres in Langell Valley, Oreg., or an approximately equal area in Modoc County, Calif. The purpose of the Lost River diversion canal is to divert run-off accumulating in Lost River below Clear Lake Reservoir and to discharge it into the Klamath River.

On June 30, 1920, the work of reclaiming Tule Lake had resulted in lowering the water surface about 15 feet in a period of 8 years. The total area uncovered is about 26,000 acres. About 19,000 acres are first-class agricultural land lying along the north shore of the lake, of which about 6,000 acres have been included in the third unit. The plan of serving the lands uncovered by the lowering of Tule Lake provides for a diversion dam on Lost River about 2 miles east of Merrill and for the construction of the J Canal and lateral system.

By contract dated February 24, 1917, between the United States and the California-Oregon Power Co. the latter undertakes to regulate the Upper Klamath Lake under the supervision of the United States for a period of 50 years. The power company agrees to construct a dam at the outlet of the lake, said dam to be the property of the United States; to make satisfactory adjustments with all interests on the Upper Klamath Lake; to furnish electric power for pumping for irrigation or drainage purposes, within 25 miles of Merrill, at the rate of 7 mills per kilowatt-hour to all installations of 100 horsepower or more, the company to install the necessary transmission lines. Subject to the foregoing, and to the further stipulation that the contract shall not curtail the right of the United States to the waters of the Upper Klamath Lake, the power company may regulate the lake between certain limits and lease the Keno Canal for a period of 10 years, with the privilege of renewal, paying an annual rental therefor of $1,000.

The principal features of the project are the Clear Lake Reservoir; the Lost River diversion dam and canal; the Main Canal and tunnel, the latter 3,300 feet in length; the precast concrete flume on the C Canal, which is 4,300 feet in length; and the main canals of the distributing system. The present irrigation system consists of 225 miles

of canals and laterals, which serve an area of about 51,000 acres, of which 6,000 acres are district lands under special contracts.

The United States claims all waste, seepage, unappropriated spring and percolating water arising within the project, and proposes to use such water in connection therewith.

SUMMARY OF GENERAL DATA FOR KLAMATH PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		140,880
Public land entered to June 30, 1921	2,748	
Public land withdrawn on June 30, 1921	27,300	
Private land June 30, 1921	110,832	
Acreage Service could have supplied in season of 1920		50,000
Estimated acreage Service can supply in season 1921		51,000
Estimated acreage Service can supply in season 1922		56,000
Acreage irrigated season of 1920, covered by crop census		38,100
Acreage cropped under irrigation season of 1920		35,260
Crops:		
Value of irrigated crops season of 1920		$904,500.00
Value of irrigated crops per acre cropped		25.65
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$289,000.00	
Unencumbered balance of previous appropriations	598,527.73	
Miscellaneous collections and transfers issued	43,458.04	
Increase of compensation	19,464.96	
Total amount authorized		$950,450.73
Encumbrances—		
Disbursements and transfers received	335,576.86	
Current liabilities	70,366.95	
Contingent liabilities	14,754.10	
Increase of compensation	19,470.87	
Total encumbrances		440,168.78
Unencumbered balance as of July 1, 1921		510,281.95
Fiscal year 1922—		
Amount specified in appropriation act		1,213,000.00
Encumbrances: Disbursements and transfers received		5.75
Unencumbered balance as of July 1, 1921		1,212,994.25
Fiscal year 1923—		
Proposed appropriation		700,000.00
Inventories:		
Value of stock on hand		70,880.62
Value of plant and equipment in use		136,434.67
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$3,296,337.05	
Less revenues and adjustments	49,678.74	
Net cost to June 30, 1921		3,246,658.31
Per cent completed on June 30, 1921	57	
Estimated per cent completed on June 30, 1922	63	
Value of construction water-right contracts and other resources to repay net cost of project		2,053,884.79
Revenues held in reserve		121,841.19
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$450,885.02	
Less charges due and miscellaneous revenues	412,547.55	
Deficit		38,338.47
Drainage:		
Total cost of drainage works to June 30, 1921		473,367.26
Miles of drains built to June 30, 1921:		
Open	98.7	
Closed	8.0	
Total		106.7
Estimated acreage damaged by seepage on June 30, 1921		2,000
Estimated acreage protected by drains to June 30, 1921		28,686
Estimated acreage to be protected by authorized system		29,686

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges	$473,019.66	$433,598.76	.....	.....	$433,598.76	$39,420.90
Operation and maintenance charges (public notice)	401,753.20	304,978.49	$4,372.02	$6,705.07	316,055.58	85,697.62
Supplemental construction to be paid as operation and maintenance	1,528.81	684.39	.....	.....	684.39	844.42
Rentals, irrigation water	40,948.48	40,931.76	.....	.....	40,931.76	16.72
Rentals, power	5,020.00	5,020.00	.....	.....	5,020.00	0.00
Rentals, grazing and farming lands	124,034.53	121,377.81	.....	.....	121,377.81	2,656.72
Contractors' freight refunds	10,854.71	9,520.14	.....	.....	9,520.14	1,334.57
Miscellaneous	7,672.64	5,298.67	.....	.....	5,298.67	2,373.97
Total	1,064,832.03	921,410.02	4,372.02	6,705.07	932,487.11	132,344.92

CONSTRUCTION DURING FISCAL YEAR.

The work done during the fiscal year comprised completion of the concrete lining on the C Canal, beginning the work of replacing the timber flume on the C Canal with a precast concrete flume, and construction of the C–G Canal headworks and the C–G Canal.

Between stations 556 and 679, a distance of 12,300 feet, the C Canal crosses a wide and shallow depression. The canal was constructed in 1908–9. The canal crosses the depression by means of a timber flume and a timber-lined canal. The flume extends from station 560 to 603 and the lined section from station 603 to 678. The lined section is in a high fill, the bottom of the canal being from 6 to 8 feet above the level of the adjoining lands. During the fallof 1919 the old timber lining was torn out for a distance of 2,200 feet and replaced with a concrete lining 3 inches thick. The remainder of the old timber lining was torn out and replaced with concrete during the fall of 1920. During the fall of 1920 the concrete lining placed amounted to 17,004 square yards 3 inches thick, or 1,417 cubic yards. The completed canal section has a base width of 4.8 feet with side slopes of $1\frac{1}{2}:1$; the lined section provides for a water depth of 5.6 feet with a freeboard of 1 foot; the capacity of the canal is 335 cubic feet per second.

The present timber flume on the C Canal extends from station 560 to 603 and has been in use for 13 seasons. The timber flume will be replaced by a precast concrete flume. The new flume will be cast in sections at the side of the present flume during the summer of 1921. After the irrigation season the timber flume will be dismantled and the precast concrete flume will be erected.

Camp was moved to the flume job shortly after the completion of the concrete lining. During the winter months a small crew was engaged in building the forms for the precast units and in bending reinforcing steel. Concreting was begun on April 27. Up to the end of the fiscal year 2,330 feet of the precast flume including bents and stringers had been completed. The old pedestals or piers will be used in the new structure. The flume barrel units are 11 feet wide, 6 feet high, and 4 feet 3 inches long. The flume units are being cast in an inverted position and the bents and stringers flat. The con-

creting equipment consists principally of a traveling platform on which is mounted the concrete mixer, the water tank, and an A frame with boom for supporting the concrete chutes. The traveler straddles the inverted flume sections and is moved forward as the work progresses.

The C–G Canal will connect the C and G Canals and will have a capacity of 738 cubic feet per second. Water will be supplied from Upper Klamath Lake through the A and C Canals. The Lost River structures on this canal will consist of three pipe lines each 6 feet 3 inches in diameter. One pipe with a capacity of 337 cubic feet per second will cross the river and supply the G Canal. One pipe with a capacity of 738 cubic feet per second will discharge directly into Lost River; under normal conditions this pipe will supply about 400 cubic feet per second to Lost River for use on the Tule Lake Division, and in an emergency this pipe will take the entire capacity of the C–G Canal. The third pipe will discharge into the Diversion Canal and will be used only in emergencies to prevent spillage from entering Tule Lake.

The headworks on the C–G Canal and the lined section at the upper end of the flume on the C Canal were constructed during April, 1921. The head-gate structure required the placing of 125 cubic yards of concrete and 39 cubic yards in protection work above the structure. Two 9 by 10 feet radial gates were installed in the head-gate structure. The concrete lining is on the C Canal and connects the C–G head-gate structure and the flume; 125 cubic yards of concrete were placed in the lined section. The excavation of the C–G Canal between stations 4 and 38 plus 74 has been completed. The work was done by Bucyrus drag line No. 121473 and involved the excavation of 40,854 cubic yards of material, 20 per cent of which was class 2.

The construction of the Main Canal for the Tule Lake Division was begun on June 20, 1921. The lower portion of the canal is being constructed by Monighan excavator No. 122235. The machine began work at station 225 and will first construct the lower bank of the canal to about station 358, after which the machine will double back and construct the upper bank of the canal. The lower bank of the canal will be built with material excavated from the canal section and the upper bank with material excavated from a parallel waste ditch.

SEEPAGE AND DRAINAGE.

The construction of the drainage system has been practically completed to the limit of the expenditures authorized by the public notice of September 15, 1915, and subsequent contracts for the Siemans ranch and for the Pettit Hill and Maddox lands. The construction of drainage works for the Upper Van Brimmer Drainage District as provided for by special contract has also been completed. The drainage system consists of 98.7 miles of open drains and 8 miles of tile drains, including 5.5 miles of open drains for Upper Van Brimmer Drainage District. The system provides drainage for 27,440 acres in the First Division, 950 acres of vested water-right lands, 174 acres in the Second Division, and 1,122 acres in the Upper Van Brimmer Drainage District. No drainage construction has been authorized for the Second and Third Divisions except as noted above. The drainage system has proved generally effective in preventing further damage from seepage. On June 30, 1921, there were approximately 1,000 acres on which the payment of construction and

operation and maintenance charges have been temporarily suspended on account of damage by seepage.

The topography of the Klamath project is such that it has been necessary to construct most of the drainage ditches on a very flat grade. Owing to the above condition some of the drainage ditches have become partly filled with silt and will require cleaning. The work of cleaning the clogged drains was begun in April, 1921, and up to the end of the fiscal year 12,700 feet of open drain had been cleaned.

During the year 17,600 linear feet of open drains were constructed, involving the excavation of 66,500 cubic yards of material.

The drainage works constructed under special contract for the Upper Van Brimmer Drainage District consist of 29,026 linear feet of open drain, which involved the excavation of 95,705 cubic yards of material.

BOARD MEETINGS.

Date.	Subject.	Personnel.
July 12-20, 1920	Sale of water right to the Klamath Drainage District; restoration of certain tracts heretofore reserved for a bird reservation around Lower Klamath Lake in California.	R. F. Walter, H. L. Holgate, H. D. Newell.
May 6, 1921	Drainage, Melhase-Ryan sump	J. L. Burkholder, H. D. Newell.

OPERATION AND MAINTENANCE.

During the season of 1920 water was delivered in accordance with the terms set forth in the public notice of February 25, 1920, which entitled the water users to 2 acre-feet of water per acre, at a cost of $2 per irrigable acre, whether water was used thereon or not. The above public notice further provides that additional water will be furnished up to 3 acre-feet per acre at the rate of 50 cents per acre-foot, and all further quantities for 75 cents per acre-foot.

During the past 6 years the annual discharge of Link River has been considerably below normal. During the run-off year ended September 30, 1920, the flow of all project streams was the lowest for 16 years. The total discharge of Link River amounted to only 1,002,000 acre-feet.

During the spring of 1919 the California-Oregon Power Co. constructed a crib dam near the upper end of Link River. The construction of the crib dam was a part of the power company's program in the construction of a permanent masonry dam for the regulation of the Upper Klamath Lake, as provided by the contract of February 24, 1917, between the United States and the California-Oregon Power Co.

During the season of 1920 the storage in the Upper Klamath Lake was a very important factor in meeting all project demands. Without the crib dam the unregulated flow of Link River would not have been sufficient for more than one-half of the project during the months of July and August. The total area irrigated during the season of 1920 was 44,800 acres, which includes 38,100 acres in the First, Second, and Third Divisions, 5,000 acres of the Van Brimmer lands, and 1,700 acres in miscellaneous pumping divisions. The total water diverted for the year was 101,626 acre-feet from Link River and 30,723 acre-feet from Lost River.

Historical review, Klamath project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	36,000	40,000	44,000	50,000	50,000	50,000
Acreage irrigated	27,254	29,351	33,635	38,269	42,881	44,800
Miles of canal operated	187	216	216	210	225	225
Water delivered (acre-feet)	68,830	66,010	66,368	101,926	119,850	132,349
Water diverted (acre-feet)	30,640	29,970	32,780	52,090	56,490	49,754
Per acre of land (acre-feet)	1.125	1.02	0.975	1.36	1.32	1.11

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 22.

SETTLEMENT.

The farmers in the Klamath Irrigation District were generally prompt in the payment of construction and operation and maintenance charges. The charges for the season of 1920 have been paid in full. The farmers of course felt the effect of the general slump in the prices of all farm products but were getting their lands in better shape for irrigation and some new building was being done. The cost of farm labor was considerably less than for 1920, and the prospects were good for a big crop in 1921.

The Enterprise Irrigation District has completed the installation of their pumping machinery and the construction of the principal canals for providing irrigation service to about 3,000 acres of land lying adjacent to the Main Canal of the Klamath project. The delivery of water to the district pumps has been provided for by a special contract between the district and the United States.

During 1920 and the first half of 1921 about 35 miles of surfaced road were constructed on the project. The work was done under the supervision of the State highway engineer. The Oregon-California & Eastern Railway has been placed in operation as far as Dairy, Oreg., 20 miles from Klamath Falls. Grading had been completed for several miles beyond Dairy, and the grading of a branch line from Dairy to Bonanza was in progress. The railroad is projected to Bend, Oreg., where it will connect with lines coming up the Deschutes River, which connect with the main line of the Oregon-Washington Railroad & Navigation Co. at The Dalles, Oreg.

Settlement data, Klamath project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	409	527	560	570	570
Population	1,580	1,610	1,800	2,000	2,050
Number of irrigated farms	409	527	530	540	542
Operated by owners or managers	287	336	340	350	352
Operated by tenants	122	191	190	190	190
Population	1,485	1,490	1,510	1,600	1,650
Number of towns	4	4	4	5	5
Population	4,700	4,800	5,000	5,300	5,500
Total population, towns and farms	6,280	6,410	6,800	7,300	7,550
Number of public schools	19	20	20	21	21
Number of churches	9	9	10	10	10
Number of banks	3	3	4	5	6
Total capital stock	$175,000	$175,000	$225,000	$500,000	$595,000
Amount of deposits	$1,118,500	$1,390,000	$2,383,000	$4,000,000	$4,500,000
Number of depositors	3,565	5,310	6,264	6,500	9,250

CROPS AND LIVE STOCK.

The season of 1920 was favorable for the growth of all crops on project lands. On the dry-farm lands adjacent to the project, the farmers had fair crops, owing largely to timely rains occurring in June and July. The last killing frost during the season of 1920 occurred on May 31 and the first in the fall occurred on September 21.

During May, 1921, the weather was cool and was accompanied by frequent rains. The last killing frost was recorded on May 27. Owing to the rains and cool weather, the demand for water during May was unusually light, water deliveries being about equal to one-half of those for May, 1920. On June 30 all farm crops were in excellent condition.

Alfalfa hay continues to be the principal crop. Live-stock farming is one of the important features of the project. The stock-raising industry is carried on principally on the open range but depends to a large extent on the project for winter feed

Crop report, Klamath project, Oregon-California, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	14,350	Ton	41,227	2.87	$14.00	$577,170	$40.20
Hay	2,622	...do	3,379	1.29	14.00	47,300	18.00
Wheat	2,736	Bushel	44,494	16.3	1.71	76,080	27.80
Oats	2,449	...do	45,848	18.7	.72	33,000	13.40
Barley	1,903	...do	46,658	24.5	.84	39,200	20.60
Rye	1,185	...do	11,850	10.0	1.26	14,930	12.60
Potatoes	201	...do	27,070	135.0	1.80	48,720	242.40
Garden	64	Acres			150.00	9,600	150.00
Pasture	9,750	...do			6.00	58,500	6.00
Total cropped	35,260	Total and average				904,500	25.65
Not cropped	2,840						
Total irrigated	38,100						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	42,156	416	90
Total irrigated area farms reported	38,100		90
Under water-right applications	38,100		90
Total cropped area farms reported	35,260		83

FINANCIAL STATEMENT.

Condensed financial statement, Klamath project, June 30, 1921.

DEBITS.

Collections on hand and in special deposits		$1,192.96
Inventory of materials and supplies on hand		70,880.62
Plant and equipment in use		136,434.67
Current accounts receivable		132,344.92
Construction charges not due		1,573,866.29
Unearned value of contracts		14,754.10
Construction cost of works	$3,221,036.02	
Operation and maintenance added to construction	3,712.03	
Operation and maintenance during construction	68,589.00	
Gross construction cost	3,296,337.05	
Less revenues and adjustments during construction period	49,678.74	
Net construction cost		3,246,658.31

Operation and maintenance cost under public notice	$494,112.55		
Less operation and maintenance added to construction	3,712.03		
Gross operation and maintenance cost		$490,400.52	
Less revenues and adjustments		408,835.52	
Deficit to Dec. 31, 1920	38,230.57		
Net cost Jan. 1 to June 30, 1921	43,334.43		
			$81,565.00
Investment items in transit			[1] 314.63
Total debits			5,257,382.24

CREDITS.

Current accounts payable			$70,532.00
Contingent and deferred liabilities			15,810.05
Resources for repaying cost of project			2,053,884.79
Revenues held in reserve			121,841.19
Investment:			
Disbursements and transfers from other projects	$3,985,352.53		
Items in transit	834.64		
Total		$3,986,187.17	
Less collections and transfers to other projects	989,723.69		
Items in transit	1,149.27		
Total		990,872.96	
Net investment			2,995,314.21
Total credits			5,257,382.24

Construction cost and revenue, Klamath project.

Principal features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and surveys: Project as a whole	[1] $4,464.51	$145,322.33
Storage works:		
Clear Lake Dam and dikes		332,279.88
Horsefly Reservoir site		670.49
Total, storage works		332,950.37
Canal system:		
Main Canal		696,968.88
East Branch Canal		49,670.32
South Branch Canal		193,495.09
Adams and Carr Canals		182,384.57
Lost River diversion channel		308,312.69
Griffith Canal enlargement		82,770.17
Ankeny Canal		57,090.00
Langell Valley Canals, preliminary		9,834.23
J Canal	7,537.46	8,350.08
J Canal headworks	2,101.76	2,331.84
South Branch cut-off canal	24,443.90	24,709.72
South Branch enlargement	2,599.38	2,599.38
Griffith Canal enlargement	93.19	93.19
Adams Canal enlargement	299.25	299.25
South Branch concrete lining	27,368.94	27,368.94
South Branch flume, supplemental construction	99,779.31	99,779.31
Supplemental construction, First Division	3,527.01	5,386.12
Total, canal system	167,750.20	1,751,443.78
Lateral system:		
First Division		150,820.54
Second Division		114,634.35
Third Division		44,121.80
Tule Lake Division	1,849.87	1,849.87
Relocation C-1 Lateral	2,735.74	2,735.74
Supplemental construction, First Division	1,697.74	25,965.30
Total, lateral system	6,283.35	340,127.60
Drainage system:		
First Division		112,282.89
Second Division		137.74
Langell Valley		428.16
Lower Klamath Lake		9,147.28
Pumping Division		2,650.02
Tule Lake Division		13,013.74
Supplemental construction, First Division	30,073.47	335,407.43
Total, drainage system	30,073.47	473,367.26

[1] Contra.

Construction cost and revenue, Klamath project—Continued.

Principal features.	Fiscal year, 1921.	Total to June 30, 1921.
Power system:		
Keno Canal		$111,329.02
South Branch power plant		740.10
McCormick tract		11,424.62
Leavitt tract		3,415.38
Total, power system		126,909.12
Farm units:		
Second Division		2,609.15
Third Division		1,640.19
Tule Lake Division	$1,418.25	2,040.66
Total, farm units	1,418.25	6,290.00
Permanent improvements:		
Headquarters	1,395.97	21,439.69
Telephone system, project as a whole		26,185.87
Operation and maintenance during construction (water rental basis)	2,209.48	68,589.00
Operation and maintenance charges transferred to and compounded with construction charges		3,712.03
Total cost of construction features	204,666.21	3,296,337.05
Less revenues earned during construction:		
Rentals of buildings	2,525.16	2,669.66
Rentals of irrigation water		31,821.45
Contractors' freight refunds	204.22	10,854.71
Other revenues, unclassified	1,041.61	2,093.66
Profit on hospital operations	1,568.85	2,909.21
Uncollected or unpayable accounts		[1] 46.50
Field cost adjustments	[1] 623.45	[1] 623.45
Total revenues	4,716.39	49,678.74
Net cost of construction of project to June 30, 1921	199,949.82	3,246,658.31

[1] Contra.

Operating cost and revenue, Klamath project.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Canal system	$9,525.98	$28,008.15	$37,534.13	$66,523.94	$100,218.57	$166,742.51
Lateral system	5,959.34	22,148.70	28,108.04	54,767.72	160,118.80	214,886.52
Drainage system		1,969.35	1,969.35		7,833.72	7,833.72
Permanent improvements		134.73	134.73		630.64	630.64
Concrete lining, C Canal		24,765.61	24,765.61		50,000.00	50,000.00
Flood protection					10,792.63	10,792.63
Total costs	15,485.32	77,026.54	92,511.86	121,291.66	329,594.36	450,886.02
Less unpaid operation and maintenance charges added to construction						3,712.03
Balance			92,511.86			447,173.99
REVENUES.						
Operation and maintenance repayments under contracts with water users:						
Charges due			83,653.25			401,749.58
Advances			42.91			42.91
Interest and penalties			82.38			1,671.74
Water rentals			1,636.52			9,275.93
Rentals of lands and buildings			[1] 1,615.66			226.10
Other revenues, unclassified			290.54			329.25
Discounts			[1] 43.44			[1] 4,352.09
Total revenues			84,046.50			408,943.42
Difference, deficit			8,465.36			38,230.57

[1] Contra.

Cost by calendar years, Klamath project.

Year ending Dec. 31—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1904	$11,498.31			$11,498.31				$11,498.31
1905	65,987.53			65,987.53				65,987.53
1906	531,011.27			531,011.27				531,011.27
1907	663,332.47		$12,430.27	675,762.74				675,762.74
1908	287,139.23		20,089.92	307,229.15				307,229.15
1909	246,820.94			246,820.94	$21,735.08		$21,735.08	268,556.02
1910	96,939.10			96,939.10	20,000.49		20,000.49	116,939.59
1911	261,951.81			261,951.81	20,981.02		20,981.02	282,932.83
1912	90,507.76			90,507.76	16,419.59		16,419.59	106,927.35
1913	155,593.28			155,593.28	18,780.80		18,780.80	174,374.08
1914	77,941.36		9,611.63	87,552.99	31,898.26		31,898.26	119,451.25
1915	151,221.87	$1,269.95	12,251.77	164,743.59	27,854.09	$1,269.95	26,584.14	191,327.73
1916	129,745.09		7,338.52	137,083.61	23,842.30		23,842.30	160,925.91
1917	100,415.35		1,145.26	101,560.61	48,447.03		48,447.03	150,007.64
1918	84,804.82	281.63	2,554.54	87,640.99	45,403.70	281.63	45,122.07	132,763.06
1919	41,762.61	2,160.45	957.61	44,880.67	83,011.80	2,160.45	80,851.35	125,732.02
1920	82,770.05		903.27	83,673.32	92,511.86		92,511.86	176,185.18
Jan. 1 to June 30, 1921	144,593.17		1,306.21	145,899.38	43,226.53		43,226.53	189,125.91
Total	3,224,036.02	3,712.03	68,589.00	3,296,337.05	494,112.55	3,712.03	490,400.52	3,786,737.57

Cost by fiscal years, Klamath project.

Year ending June 30—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1905	$34,559.30			$34,559.30				$34,559.30
1906	172,254.23			172,254.23				172,254.23
1907	827,030.70			827,030.70				827,030.70
1908	302,201.46		$18,767.01	320,968.47				320,968.47
1909	319,322.32		13,753.18	333,075.50	$9,807.10		$9,807.10	342,882.60
1910	195,619.44			195,619.44	21,999.76		21,999.76	217,619.20
1911	119,572.90			119,572.90	23,107.90		23,107.90	142,680.80
1912	221,744.70			221,744.70	15,140.58		15,140.58	236,885.28
1913	139,633.80			139,633.80	16,458.96		16,458.96	156,092.76
1914	111,896.82		3,851.46	115,748.28	25,582.51		25,582.51	141,330.79
1915	159,401.83	$1,269.95	12,906.08	173,577.86	34,700.08	$1,269.95	33,430.13	207,007.99
1916	104,881.21		8,075.81	112,957.02	24,158.12		24,158.12	137,115.14
1917	108,457.37		5,513.83	113,971.20	29,579.92		29,579.92	143,551.12
1918	102,039.15	281.63	1,574.12	103,894.90	53,522.47	281.63	53,240.84	157,135.74
1919	69,537.23	2,160.45	1,425.39	73,123.07	54,509.93	2,160.45	52,349.48	125,472.55
1920	33,426.83		512.64	33,939.47	97,345.72		97,345.72	131,285.19
1921	202,456.73		2,209.48	204,666.21	88,199.50		88,199.50	292,865.71
Total	3,224,036.02	3,712.03	68,589.00	3,296,337.05	494,112.55	3,712.03	490,400.52	3,786,737.57

General expense, Klamath project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$3,610.72	$4,150.85	$7,761.57	$62,710.53	$26,180.35	$88,890.88
Project office	7,343.24	8,445.82	15,789.06	186,641.45	91,542.99	278,184.44
Denver office	1,624.05	1,868.73	3,492.78	9,541.32	6,896.94	16,438.26
District counsel's office	1,422.46	1,634.72	3,057.18	4,808.30	6,362.25	11,170.55
Other offices and miscellaneous				57,282.33	5,765.91	63,048.24
Total	14,000.47	16,100.12	30,100.59	320,983.93	136,748.44	457,732.37
Percentage of general expense to gross cost	6.9	17.8	10.3	9.9	24.3	12.1

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

B. E. Hayden, project manager, Newell, S. Dak.

LOCATION.

Counties: Butte and Meade.

Townships: 6 to 10 N., Rs. 3 to 8 E., Black Hills meridian.

Railroads: Chicago & North Western; Chicago, Burlington & Quincy; Chicago, Milwaukee & St. Paul.

Project cities and towns and estimated population June 30, 1921: Belle Fourche, 1,600; Newell, 400; Nisland, 200; Fruitdale, 75; Vale, 75.

WATER SUPPLY.

Source of water supply: Belle Fourche River.

Area of drainage basin: 4,265 square miles.

Annual run-off in acre-feet: Belle Fourche River at diversion dam (4,265 square miles), 1903 to 1920—maximum, 554,600; minimum, 119,800; mean, 325,750.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1921: 82,430 acres.

Area under water-right applications, season of 1921: 77,045 acres.

Length of irrigation season: May 1 to October 1—152 days.

Average elevation of irrigable area: 2,800 feet above sea level.

Rainfall on irrigable area: 10 years, average, 14.55 inches; 1920, 23.30 inches.

Range of temperature on irrigable area: −38° to 103° F.

Character of soil of irrigable area: North side of Belle Fourche River principally heavy clay soil, with scattered areas of sandy clay loam; south side, sandy loam. All of the soils are heavy enough not to be disturbed by winds.

Principal products: Grain, corn, alfalfa, potatoes, garden truck, and sugar beets.

Principal markets: Omaha, Nebr.; Chicago, Ill.; and mining towns in the Black Hills.

LANDS OPENED FOR IRRIGATION.

Dates of public notices, regulations, and orders relating thereto: June 21, 1907; May 29, 1908; January 18, 1909; February 19, November 26, 1910; January 24, March 9, May 4, December 30, 1911; February 3, May 2, 1912; February 26, June 23, July 21, 1913; January 19, February 26, May 29, August 14, September 24, 1914; April 10, May 18, 1915; March 10, March 16, July 6, 1916; January 9, February 10, October 4, 1917; April 10, 1918; March 8, April 28, 1919; March 1, 1920.

Location: Tps. 7 to 10 N., Rs. 2 to 7 E.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 1.5 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $30, $35, $40, and $45.

Annual operation and maintenance charge: For 1920 and 1921, $1.50 per acre-foot for water used in July and August, and 75 cents per acre-foot for all other water used, with a minimum rate of $2 per acre.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers April 29, 1904.

Construction authorized by Secretary May 10, 1904.

Diversion dam and inlet canal completed September, 1907.

Belle Fourche Dam completed June, 1911.

First irrigation, season of 1908.

Entire project 85.9 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Belle Fourche project provides for the diversion of water from the Belle Fourche River by means of a dam about 1½ miles below Belle Fourche, S. Dak., and an inlet or supply canal about 6½ miles in length into a storage reservoir controlled by the Belle Fourche Dam on Owl Creek, a tributary of the Belle Fourche River; the distribution of water from the inlet canal to a small area of land and the distribution of water from the reservoir through two canal systems to lands on both sides of the Belle Fourche River.

The United States claims all waste, seepage, unappropriated spring, and percolating waters arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan completed are the diversion dam, headworks, inlet canal, Belle Fourche storage dam, south canal and laterals, north canal and all tributary laterals and structures. The features not yet constructed are Willow Creek and Nine Mile laterals and their tributaries, covering approximately 15,000 acres of land.

SUMMARY OF GENERAL DATA FOR BELLE FOURCHE PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		97,430
Public land entered to June 30, 1921	37,481	
Public land open to entry on June 30, 1921	149	
Public land withdrawn on June 30, 1921	7,500	
State land unsold, June 30, 1921	301	
Private land June 30, 1921	51,999	
Acreage Service could have supplied in season of 1920		82,430
Estimated acreage Service can supply in season 1921		82,430
Estimated acreage Service can supply in season 1922		82,430
Acreage irrigated season of 1920		59,850
Acreage cropped under irrigation season of 1920		59,850
Crops:		
Value of irrigated crops season of 1920		$832,200
Value of irrigated crops per acre cropped		13.90
Finances:		
Appropriations:		
Fiscal year 1921—		
Amount specified in appropriation act	$120,000.00	
Unencumbered balance of previous appropriations	189,160.19	
Miscellaneous collections and transfers issued	3,143.33	
Increase of compensation	13,542.34	
Total amount authorized		325,845.86
Encumbrances—		
Disbursements and transfers received	159,381.24	
Current liabilities	23,266.53	
Contingent liabilities	65,389.10	
Increase of compensation	13,542.34	
Total encumbrances		261,579.21
Unencumbered balance as of July 1, 1921		64,266.65
Fiscal year 1922—		
Amount specified in appropriation act		485,000.00
Fiscal year 1923—		
Proposed appropriation		370,000.00
Inventories:		
Value of stock on hand		37,555.32
Value of plant and equipment in use		29,446.17
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$3,499,275.45	
Less revenues and adjustments	18,949.41	
Net cost to June 30, 1921		3,480,326.04
Per cent completed on June 30, 1921	85.9	
Estimated per cent completed on June 30, 1922	87.5	
Estimated per cent completed on June 30, 1923	94.0	
Value of construction water-right contracts and other resources to repay net cost of project		2,616,632.03
Revenues held in reserve		11,066.49
Operation and maintenance cost:		
Gross cost to Dec. 31, 1920	$742,180.98	
Less charges due and miscellaneous revenues	634,192.52	
Deficit		107,988.46
Drainage:		
Total cost of drainage works to June 30, 1921 (investigations)		$3,344.27
Estimated acreage damaged by seepage on June 30, 1921		3,570

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Discount.	Total.	
Construction charges	$500,092.73	$421,794.63	.....	$421,794.63	$78,298.10
Operation and maintenance charges (public notice)	623,620.60	459,664.29	$10,909.36	470,573.65	153,046.95
Supplemental construction to be paid as operation and maintenance	20,428.64	15,112.32	.....	15,112.32	5,316.32
Rentals, irrigation water	3,858.22	3,708.22	.....	3,708.22	150.00
Contractor's freight refunds	2,901.11	2,880.32	.....	2,880.32	20.79
Miscellaneous	15,831.47	15,632.08	.....	15,632.08	199.39
Total	1,166,732.77	918,791.86	10,909.36	929,701.22	237,031.55

CONSTRUCTION DURING FISCAL YEAR.

Plans were formulated during the first half of the fiscal year for beginning the construction of the Willow Creek Division in a comprehensive way early in the spring of 1921. Field surveys were well along at the close of 1920 and the construction program contemplated the awarding of contracts, prior to the close of the fiscal year, for all excavation and practically all structure work. Owing to reduction of allotment, however, the only work undertaken was the excavation of laterals and sublaterals comprising about 200,000 cubic yards of class one material. Contract for this work was let to Threet Bros., of Lovell, Wyo., on April 26, 1921, at 23 cents per cubic yard. At the close of the fiscal year the work was being prosecuted by six subcontractors working 104 head of stock; 16,768 cubic yards of earth had been moved.

SEEPAGE AND DRAINAGE.

Seepage encroachment during the year was very slight. The additional acreage relieved of charges on account of seepage amounted to 430 acres.

It has been impossible, so far, to stir up any decided sentiment in favor of laying out a comprehensive drainage program for the project, although numerous attempts have been made looking to that end.

OPERATION AND MAINTENANCE.

The season of 1920 was unusual owing to excessive rains during the spring months. The average precipitation over the project for the year was 23.3 inches as compared with a 10-year average of 14.55 inches. The total flow of the Belle Fourche River was 506,389 acre-feet and the maximum flow 5,679 second-feet. Storage in the Belle Fourche Reservoir on June 30 was 158,380 acre-feet. The use of water for irrigation was light and did not begin until July 1.

The first killing frost occurred on September 27 and the last on May 15.

Cost of maintenance of canals during the fiscal year was unusually heavy owing to the necessity of bringing canals and laterals back to a statisfactory state of repair after two years of neglect as a result

of adverse weather and labor conditions. At the close of the year, however, the system was in excellent condition.

Historical review, Belle Fourche project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	78,591	78,591	83,335	82,592	82,634	82,430
Acreage irrigated	44,067	48,468	51,000	52,445	56,638	59,850
Miles of canal operated	528	529	612	612	615	615
Water diverted (acre-feet)	135,804	58,395	171,749	190,844	121,293	101,113
Water delivered to farms (acre-feet)	16,484	39,133	61,134	51,731	82,409	36,616
Per acre of land irrigated (acre-feet)	0.37	0.81	1.21	0.99	1.46	0.61

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 22.

SETTLEMENT AND DEVELOPMENT.

No new areas were added to the irrigable area during the year. Development was slow owing to the financial depression and inability of farmers to sell crops for cost of production. Much of the hay crop found no market whatever and was still in the fields. No land transfers occurred; in fact business has been at a very low ebb for months.

Settlement data, Belle Fourche project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	1,292	1,292	1,292	1,292	1,292
Population	2,375	2,400	2,675	2,675	2,700
Number of irrigated farms	744	813	906	1,000	1,024
Operated by owners or manager	495	553	590	668	692
Operated by tenant	249	260	316	332	332
Population	2,067	2,150	2,424	2,597	2,650
Number of towns	5	5	5	5	5
Population	1,775	1,845	2,100	2,200	2,350
Total population in towns and on farms	4,150	4,245	4,775	4,875	5,050
Number of public schools	23	23	24	24	26
Number of churches	11	11	11	11	9
Number of banks	9	9	9	9	9
Total capital stock	$140,000	$140,000	.....	.....	$250,000
Amount of deposits	$1,464,305	$2,206,993	$2,391,262	$3,387,680	$2,657,621
Number of depositors	4,228	.....	.....	.....	6,560

PRINCIPAL CROPS.

The acreage of alfalfa on the project is approximately 26,000 and is about three times as great as that in wheat, which is next in importance. Following in the order of acreage come oats, corn, native hay, barley, and sugar beets. The total area cropped was 59,850 acres and the per acre value of the crop was $13.90.

The crop outlook for the season of 1921 was good where proper care had been exercised in irrigating and cultivating.

Irrigated crop report, Belle Fourche project, South Dakota, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Average per unit of yield.	Total.	Average per acre.
Alfalfa hay	26,040	Ton	48,734	1.87	$8.00	$389,870	$14.99
Alfalfa seed	752	Bushel	162	.22	15.00	2,430	3.23
Barley	1,695	...do	25,744	15.19	.45	11,580	6.83
Beets, sugar	1,103	Ton	10,291	9.33	10.50	108,055	97.96
Corn	3,272	Bushel	62,589	19.12	.75	46,940	14.35
Corn fodder	308	Ton	460	1.49	5.00	2,300	7.47
Garden	134					14,870	111.00
Native hay	2,820	Ton	2,974	1.06	8.00	23,790	8.43
Oats	4,864	Bushel	112,022	23.03	.45	50,410	10.37
Pasture	8,390					67,130	8.00
Potatoes	122	Bushel	14,516	119.00	1.25	18,140	148.73
Flax	145	...do	830	5.72	1.25	1,035	7.16
Wheat	9,850	...do	49,815	5.06	1.75	87,170	8.85
Miscellaneous	355					8,480	23.90
Total irrigated and cropped.	59,850	Total and average				832,200	13.90

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported [1]	77,202	1,024	[2] 79
Total irrigated area farms reported	59,850	858	61
Irrigated under water-right applications	59,850	858	61
Total cropped area farms reported	59,850		61

[1] Seeped, 3,396 acres. [2] Based on 97,430 acres.

FINANCIAL STATEMENT.

Condensed financial statement, Belle Fourche project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit		$737.40
Inventory of materials and supplies on hand		37,555.32
Plant and equipment in use		29,446.17
Current accounts receivable		237,031.55
Construction charges not due		2,095,633.28
Unearned value of contracts		65,389.10
Construction cost of works	$3,478,840.96	
Operation and maintenance added to construction	20,434.49	
Gross construction cost	3,499,275.45	
Less revenues and adjustments during construction period	18,949.41	
Net construction cost		3,480,326.04
Operation and maintenance cost under public notice	826,767.51	
Less operation and maintenance added to construction	20,434.49	
Gross operation and maintenance cost	806,333.02	
Less revenues and adjustments	633,614.67	
Deficit to Dec. 31, 1920	$107,988.46	
Net cost Jan. 1 to June 30, 1921	64,729.89	
		172,718.35
Investments items in transit		112.12
Total debits		6,118,949.33

CREDITS.

Current accounts payable	23,896.55
Contingent and deferred liabilities	66,126.50
Resources for repaying cost of projects	2,616,632.03
Revenues held in reserve	11,066.49

Investment:			
Disbursements and transfers from other projects	$4,413,858.00		
Items in transit	36.12		
Total		$4,413,894.12	
Less collections and transfers to other projects	1,012,742.36		
Items in transit	[1] 76.00		
Total		1,012,666.36	
Net investment			$3,401,227.76
Total credits			6,118,949.33

Construction cost and revenue, Belle Fourche project.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and survey		$806.09
Storage works:		
Diversion dam in Belle Fourche River		130,965.97
Feed Canal		340,670.36
Belle Fourche Dam		1,259,515.02
Supplemental construction on Belle Fourche Dam		33,187.93
Johnston Lateral storage investigations	$2,412.08	7,124.30
Total	2,412.08	1,771,463.58
Canal system:		
North Canal		497,009.30
South Canal		493,880.50
Total		990,889.80
Lateral system:		
Lateral Division A		252,781.75
Lateral Division B		129,230.17
Lateral Division C		67,710.43
Lateral Division D		134,176.32
South Canal extension		36,699.44
Completing unfinished deliveries		2,288.26
Willow Creek Division	13,999.08	17,167.56
Nine Mile Creek investigations		4,955.24
Total	13,999.08	645,009.17
Drainage system:		
Investigations		3,344.27
Supplemental construction (Deer Creek Drain)	1,645.45	1,648.95
Total	1,645.45	4,993.22
Farm unit surveys:		
Original project		6,246.64
Willow Creek Division	1,687.16	3,877.93
Total	1,687.16	10,124.57
Permanent improvements	[1] 580.00	40,970.86
Telephone system		14,583.67
Operation and maintenance charges transferred to and compounded with construction charges	[1] 27.44	20,434.49
Gross cost to June 30, 1921	19,136.33	3,499,275.45
Less revenue earned during construction period:		
Rental of buildings	889.83	8,118.78
Freight refunds		2,880.32
Rentals of irrigation water	309.89	1,404.89
Profit on hospital operations		2,735.29
Other revenues, unclassified		3,810.13
Total revenues	1,199.72	18,949.41
Net construction cost June 30, 1921	17,936.61	3,480,326.04

[1] Contra.

Operating cost and revenue, Belle Fourche project.

Item.	Calendar year 1920.			To end of calendar year 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COST.						
Storage works:						
Diversion dam and inlet canal	$1,640.23	$9,199.91	$10,840.14	.....	.....	.....
Storage-dam reservoir	1,060.71	583.55	1,644.26	.....	.....	.....
Total storage works	2,700.94	9,783.46	12,484.40	$26,017.32	$65,926.53	$91,943.85
Canal system:						
North canal system	1,127.95	27,070.94	28,198.89	.....	.....	.....
South canal system	1,499.14	9,883.87	11,383.01	.....	.....	.....
Total canal system	2,627.09	36,954.81	39,581.90	38,764.79	174,331.12	213,095.91
Lateral system:						
North Canal lateral system	4,164.71	67,378.53	71,543.24	.....	.....	.....
South Canal lateral system	1,086.69	21,090.64	22,177.33	.....	.....	.....
Johnston lateral system	428.15	6,477.53	6,905.68	.....	.....	.....
Total lateral system	5,679.55	94,946.70	100,626.25	81,036.40	347,932.46	428,968.86
Drainage system	.....	.....	.....	.....	3,624.44	3,624.44
Permanent improvements	.....	3,941.37	3,941.37	.....	18,475.38	18,475.38
Miscellaneous expense: Water-right adjudication investigations	331.90	.....	331.90	6,484.07	.....	6,484.07
Total costs	11,339.48	145,626.34	156,965.82	152,302.58	610,289.93	762,592.51
Less unpaid operation and maintenance charges added to construction	.....	.....	[1] 54.13	.....	.....	20,411.53
Balance	.....	.....	157,019.95	.....	.....	742,180.98
REVENUES.						
Operation and maintenance repayments under contracts with water users:						
Payments advanced	.....	.....	8.94	.....	.....	8.94
Charges due	.....	.....	148,380.91	.....	.....	624,966.21
Forfeitures	.....	.....	[1] 514.65	.....	.....	.....
Interest and penalties	.....	.....	2,289.55	.....	.....	11,668.30
Water rentals	.....	.....	208.14	.....	.....	2,276.58
Rentals of lands and buildings	.....	.....	498.75	.....	.....	3,054.31
Other revenues unclassified	.....	.....	1,019.42	.....	.....	2,329.89
Farming operations	.....	.....	[1] 837.13	.....	.....	[1] 837.13
Discounts	.....	.....	[1] 3,302.55	.....	.....	[1] 9,274.58
Total revenues	.....	.....	147,751.38	.....	.....	634,192.52
Difference, deficit	.....	.....	9,268.57	.....	.....	107,988.46

[1] Contra.

Cost by calendar years, Belle Fourche project.

Year ending Dec. 31—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1909 and prior	$2,246,200.32	.....	$2,246,200.32	.....	.....	.....	$2,246,200.32
1910	372,235.93	.....	372,235.93	.....	.....	.....	372,235.93
1911	435,144.39	.....	435,144.39	$96,682.90	.....	$96,682.90	531,827.29
1912	61,906.76	.....	61,906.76	58,911.39	.....	58,911.39	120,818.15
1913	47,965.86	.....	47,965.86	55,737.46	.....	55,737.46	103,703.32
1914	107,097.36	.....	107,097.36	60,060.62	.....	60,060.62	167,157.98
1915	66,974.22	.....	66,974.22	47,542.16	.....	47,542.16	114,516.38
1916	95,882.87	$13,003.17	108,886.04	55,109.53	$13,003.17	42,106.36	150,992.40
1917	8,546.40	3,771.78	12,318.18	75,764.14	3,771.78	71,992.36	84,310.54
1918	3,193.38	2,008.85	5,202.23	77,260.74	2,008.85	75,251.89	80,454.12
1919	11,684.71	1,681.86	13,366.57	78,291.88	1,681.86	76,610.02	89,976.59
1920	9,374.13	[1] 54.13	9,320.00	157,231.69	[1] 54.13	157,285.82	166,605.82
Jan. 1 to June 30, 1921	12,634.63	22.96	12,657.59	64,175.00	22.96	64,152.04	76,809.63
Total	3,478,840.96	20,434.49	3,499,275.45	826,767.51	20,434.49	806,333.02	4,305,608.47

[1] Contra.

Cost by fiscal years, Belle Fourche project.

Year ending June 30—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1910 and prior	$2,393,302.64	.....	$2,393,302.64	.....	.....	.....	$2,393,302.64
1911	464,226.74	.....	464,226.74	.....	.....	.....	464,226.74
1912	254,448.01	.....	254,448.01	$123,399.85	.....	$123,399.85	377,847.86
1913	12,925.77	.....	12,925.77	60,392.66	.....	60,392.66	73,318.43
1914	73,888.75	.....	73,888.75	52,594.44	.....	52,594.44	126,483.19
1915	107,044.28	.....	107,044.28	55,748.66	.....	55,748.66	162,792.94
1916	66,915.93	$13,003.17	79,919.10	53,946.76	$13,003.17	40,943.59	120,862.69
1917	64,519.63	2,417.06	66,936.69	56,318.72	2,417.06	53,901.66	120,838.35
1918	6,505.92	2,477.32	8,983.24	82,923.62	2,477.32	80,446.30	89,429.54
1919	9,632.59	880.65	10,513.24	74,876.26	880.65	73,995.61	84,508.85
1920	5,686.93	1,683.73	7,370.66	112,811.78	1,683.73	111,128.05	118,498.71
1921	19,743.77	[1] 27.44	19,716.33	153,754.76	[1] 27.44	153,782.20	173,498.53
Total	3,478,840.96	20,434.49	3,499,275.45	826,767.51	20,434.49	806,333.02	4,305,608.47

[1] Contra.

General expense, Belle Fourche project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$849.37	$3,181.43	$4,030.80	$53,153.58	$26,954.81	$80,108.39
Project office	2,783.80	9,345.50	12,129.30	103,939.52	74,703.36	178,642.88
Denver office	352.58	1,329.40	1,681.98	2,104.01	4,292.51	6,396.52
District counsel's office	359.63	957.62	1,317.25	3,738.85	4,457.44	8,196.29
Other offices and miscellaneous	151.67	637.36	789.03	28,593.29	9,784.12	38,377.41
Total	4,497.05	15,451.31	19,948.36	191,529.25	120,192.24	311,721.49
Percentage of general expense to gross cost	22.77	10.01	11.49	5.5	14.5	7.23

UTAH, STRAWBERRY VALLEY PROJECT.

W. L. WHITTEMORE, project manager, Provo, Utah.

LOCATION.

Counties: Utah and Wasatch.

Townships: 8, 9, and 10 S., Rs. 1 to 3 E., Salt Lake base and meridian.

Railroads: Denver & Rio Grande; Salt Lake Route.

Project cities and towns and estimated population, June 30, 1921: Benjamin, 600; Clinton, 50; Genola, 200; Lake Shore, 500; Mapleton, 750; Palmyra, 400; Payson, 3,450; Salem, 800; Santaquin, 1,100; Spanish Fork, 4,500; Spring Lake, 250; Springville, 3,350.

WATER SUPPLY.

Source of water supply: Strawberry and Spanish Fork Rivers and a number of small streams and springs not on the watersheds of these two. Contemplated pumping plants.

Area of drainage basins: Strawberry River, including Indian and Trail Hollow Creeks, 175 square miles; Spanish Fork River, 670 square miles.

Annual run-off in acre-feet; Strawberry River, including Indian and Trail Hollow Creeks, 1903–1912, maximum 150,000, minimum 49,000, mean 77,500; 1913–1920 (net inflow), maximum 104,000, minimum 39,000, mean 69,145. Spanish Fork River at Spanish Fork, 1903–1920, maximum 227,000, minimum 65,000, mean 121,750.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water during the season of 1921: 52,500 acres; reservoir has in storage 261,500 acre-feet available for irrigation purposes.

Length of irrigating season: April 15 to September 30, 169 days.

Average elevation of irrigable area: 4,600 feet above sea level.

Rainfall on irrigable area: At Provo, average for 30 years, 15.07 inches; 1920, 21.8 inches. At Strawberry Reservoir, average 9 years, 21.4 inches; 1920, 22.93 inches.

Range of temperature on irrigable area: Average of extreme maximum temperature for 23 years, 100°; average of extreme minimum temperature for 23 years, – 11.5°; average maximum temperature during hottest month (July), 90.9°; average minimum temperature during coldest month (January), 16.4° F.

Character of soil on irrigable area: Sandy loam, heavy clay, and varying mixture of both; black alluvium; loam; and gravel. Much of the soil is underlaid by a coarse gravel, and the natural drainage is excellent.

Principal products: Alfalfa, hay, cereals, sugar beets, fruits, and vegetables.

Principal markets: Salt Lake City, Utah, and adjacent towns and mining districts.

LANDS OPENED FOR IRRIGATION BY PUBLIC NOTICE.

	Acres.
Spanish Fork Division: Oct. 9, 1915; May 21, 1917; Apr. 30, 1918; Mar. 11, 1919; Feb. 20, Apr. 26, 1920; Feb. 15, 1921	31,301.84
Lake Shore Division: Oct. 8, 1915; May 9, 1916; May 21, 1917; Mar. 11 1919; Feb. 20, 1920; Apr. 26, 1920; Feb. 15, 1921	5,862.97
High Line Division: May 13, 1916; May 21, 1917; Mar. 11, 1919; Feb. 20, 1920; Feb. 15, 1921	21,844.40
Power Canal Division: Jan. 14, 1918; Mar. 26, 1920; Feb. 15, 1921	110.00
Total	59,119.21

In addition, the Service has contracted to sell to the Spanish Fork Canyon Division, embracing lands lying along Soldier Fork, Diamond Fork, and Thistle Creeks, a total of 1,282.40 acre-feet of water per annum; also 5,175 acre-feet to the Mapleton Irrigation District; 4,400 acre-feet to the Springville Irrigation District; 440 acre-feet to Spanish Fork City; and 1,400 acre-feet to Payson City.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers October 2, 1905.
Construction authorized by Secretary December 15, 1905.
Excavation of tunnel completed June 20, 1912.
Storing of water in Strawberry Reservoir begun July 14, 1912.
Construction of Indian Creek Dike completed September, 1912.
Strawberry Tunnel formally opened September 13, 1913.
Construction of Strawberry Dam completed September 20, 1913.
Construction started on High Line Canal January, 1915.
First storage water used for irrigation June 27, 1915.
Divisions 1 to 9, distribution system, practically completed December 31, 1915.
High Line Canal turned over to water users April 24, 1916.
Mapleton and Springville Irrigation Districts formed August 20, 1917, and September 4, 1917, respectively.
Mapleton lateral started March 15, 1918.
Mapleton Lateral completed October 11, 1918.
Project as a whole 99 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Strawberry Valley project provides for the storage of water in a reservoir on the Strawberry River; the discharge of the stored water through the Strawberry Tunnel, approximately 3¾ miles long, into Diamond Fork, a tributary of the Spanish Fork River, and the diversion of water from the Spanish Fork River into canal systems watering lands east and south of Utah Lake, in Utah County. A hydroelectric plant on the south side of the river supplies power for construction and commercial purposes. Part of the power developed may ultimately be used for pumping water for irrigation of high lands and drainage of low lands. The United States claims all waste, seepage, unappropriated spring and percolating water arising within the project and proposes to use such water in connection therewith.

The High Line Division, comprising approximately 23,000 acres, has at the present time been brought under irrigation by means of a canal system constructed by the United States. The Spanish Fork and Lake Shore Divisions are supplied with water through their existing canal systems, which were constructed by them. Any necessary enlargements or extensions will be made by the water users comprising the various canal companies, for according to the terms of the contract between the United States and the canal companies the responsibility of the United States ends with the delivery of the water at the heads of the various canals. In the case of the Spanish Fork Canyon Division water belonging to appropriators below the confluence of Diamond Fork with the Spanish Fork River is used by persons above this point, and an equal amount of water is released from the Strawberry Reservoir for the benefit of the prior appropriators. The water users build all of the ditches and other irrigation structures themselves.

The completed features of the irrigation plan are: Diversion dam on the Spanish Fork River; power canal; the first unit of the hydroelectric power plant on the Spanish Fork River; all of the canal system of the High Line Division, including all canals and laterals irrigating Goshen Valley and the land between the west side of West Mountain and Utah Lake; the Mapleton Lateral, capacity 85 second-feet, irrigating approximately 10,000 acres of land in the vicinity of Mapleton and Springville; and the following features in connection with the Strawberry Reservoir: Strawberry Dam, Indian Creek Dike, Indian Creek and Trail Hollow Feeder Canal and appurtenant structures, and the East Portal camp. In connection with the construction of these features 55 miles of wagon road, 44 miles of telephone line, and 54 miles of high-tension transmission lines have been built. Power from the United States Reclamation Service power house is being supplied to the cities of Payson, Spanish Fork, Springville, and Salem for lighting and commercial purposes.

The United States built the high-tension lines from its power house to these towns. The towns built their own substations, with the exception of Springville, and own their distributing systems in all cases.

Three irrigation districts, Mapleton, Springville, and Santaquin, have been formed under the State laws. Mapleton and Springville Irrigation Districts have entered into contract with the United States for the purchase under the Warren Act of 9,575 acre-feet of water.

The work remaining to be done is the disposal of the balance of project water supply by additional sales of water to lands under the Spanish Fork and High Line Divisions, portions of which are at present being drained through drainage districts organized

under the State laws, and the construction of a transmission line, pumping plant, and pipe line for furnishing approximately 2,000 acre-feet of water to the Santaquin Irrigation District, recently organized, but for which no contract has as yet been executed. No further construction work is contemplated on any of the completed divisions of the project, as contracts with the canal companies under these divisions provide that the water shall be delivered at the head gates of the several irrigation canals, and the canal companies shall deliver the water from these points to the land.

SUMMARY OF GENERAL DATA FOR STRAWBERRY VALLEY PROJECT TO END OF FISCAL YEAR, 1921.

Areas:		
Irrigable acreage when project is complete		54,000
Public land entered to June 30, 1921	1,953	
Public land open to entry on June 30, 1921	38	
Private land June 30, 1921	52,009	
Acreage Service could have supplied in season of 1920		50,000
Estimated acreage Service can supply in season 1921		52,500
Estimated acreage Service can supply in season 1922		52,500
Acreage irrigated season of 1920		[1] 45,450
Acreage irrigated season of 1920 (crop census)		32,350
Acreage cropped under irrigation season of 1920 (crop census)		29,250
Crops:		
Value of irrigated crops season of 1920 (crop census)		$1,945,900
Value of irrigated crops per acre cropped		66.50
Finances:		
Appropriations:		
Fiscal year 1921—		
Amount specified in appropriation act	$86,000.00	
Increase under 10 per cent provision	8,600.00	
Miscellaneous collections and transfers issued	42,539.52	
Increase of compensation	11,764.12	
Total amount authorized		$148,903.64
Encumbrances—		
Disbursements and transfers received	113,434.28	
Current liabilities	551.31	
Increase of compensation	11,772.12	
Total encumbrances		125,757.71
Unencumbered balance as of July 1, 1921		23,145.93
Fiscal year 1922—		
Amount specified in appropriation act		144,000.00
Encumbrances—		
Disbursements and transfers received	22,673.91	
Current liabilities	3,231.39	
Total encumbrances		25,905.30
Unencumbered balance as of July 1, 1921		118,094.70
Fiscal year 1923—		
Proposed appropriation		85,000.00
Inventories:		
Value of stock on hand		19,638.23
Value of plant and equipment in use		9,068.10
Construction cost and per cent completed:		
Gross cost to June 30, 1921	3,502,326.70	
Less revenues and adjustments	21,499.74	
Net cost to June 30, 1921		3,480,826.96
Per cent completed on June 30, 1921	99	
Estimated per cent completed on June 30, 1922	99	
Estimated per cent completed on June 30, 1923	100	
Value of construction water-right contracts and other resources to repay net cost of project		3,069,950.23
Revenues held in reserve		105,834.18
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$180,825.24	
Less charges due and miscellaneous revenues	162,568.67	
Deficit		18,256.57

[1] Including High Line, Spanish Fork, and Lake Shore Divisions and Mapleton and Springville Irrigation Districts.

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Discount.	Total.	
Construction charges	$262,725.21	$250,205.12	.....	$250,205.12	$12,520.09
Operation and maintenance charges (public notice)	153,301.42	140,573.80	$5,518.70	146,092.50	7,208.92
Rentals, irrigation water	8,388.39	8,388.39	.....	8,388.39	.....
Rentals, power	81,051.90	78,251.59	.....	78,251.59	2,800.31
Rentals, grazing and farming lands	145,892.63	145,892.63	.....	145,892.63	.....
Contractors' freight refunds	692.63	691.61	.....	691.61	1.02
Miscellaneous	706.87	.....	.....	.....	706.87
Total	652,759.05	624,003.14	5,518.70	629,521.84	23,237.21

CONSTRUCTION DURING FISCAL YEAR.

No construction work was done during the year.

OPERATION AND MAINTENANCE.

STORAGE WORKS.

Strawberry Tunnel.—Extensive repairs were made to Strawberry Tunnel during the year. Camp was established at West Portal during July when a force of 6 men and foreman started quarry operations for obtaining concrete material. Machinery, equipment, and supplies were hauled to West Portal camp and crushing, mixing, and heating plants erected for concrete operations. Actual concrete work in the tunnel began on November 30, with a force of 50 men and a superintendent of construction, and continued without interruption with two shifts until June 15, when repair work was stopped and camp shut down owing to the beginning of the irrigation season. Altogether 1,050 cubic yards of concrete, and 129 cubic yards of sand mortar finish were placed in the tunnel; a total of 131 concrete bays reinforced with 25-pound steel rails were put in at different places in the tunnel; 4,620 linear feet of new floor and fillets and 7,000 linear feet of double fillets put in between stations 0 and 120.

Strawberry Dam.—On May 27, Strawberry Reservoir was filled for the second time since the opening of the project in 1915. The spillway at Strawberry Dam was in operation from May 27 to June 16, the maximum discharge reaching approximately 350 second-feet on June 15. On June 17, 18-inch stop logs were inserted across the spillway and the entire reservoir held 1.6 feet above normal level. During this period of high water no unusual seepage or leakage through the dam was noted.

Feeder canals.—The usual operation and maintenance work of Indian Creek and Trail Hollow feeder canals was accomplished without trouble during the year. All water was turned out of the Trail Hollow and Indian Creek canals from May 26 to June 16, when water was again diverted into Strawberry Reservoir.

Indian Creek Dike.—No unusual trouble was encountered in the operation and maintenance of this structure.

East Portal permanent camp.—This camp was in charge of two men who supervise and look after all structures comprising the

storage works. No unusual trouble was encountered and all gates and hoisting mechanisms were operated successfully throughout the irrigation season. New lignum-vitæ step bearings were installed in the 14-inch turbine driving the hoisting mechanism.

CARRIAGE SYSTEM.

Sixth Water Channel.—No work was done during the fiscal year in maintenance or improvements to Sixth Water Channel. The channel from West Portal to Diamond Fork is still unstable and with the increasing amount of water delivered each year, the channel is changing continually in many places. However, the stream has reached permanent bottom in some places and it is anticipated that the channel will, before another two or three years, reach permanent bottom over its entire length.

Diamond Fork road.—Considerable work was done during the year on Diamond Fork road between Diamond Switch and West Portal camp. This work was done to permit transportation of equipment and supplies for carrying on repairs to Strawberry Tunnel.

POWER SYSTEM.

Power Canal.—The Power Canal was operated without any unusual difficulties during the year. The Spanish Fork Diversion Dam and Main Distribution (Power) Canal were in charge of one man and one assistant during the irrigation season. The upper portion of the canal was cleaned during the fall and spring, and rocks and débris removed. In order to divert into the canal sufficient water for all purposes during the present irrigation season it was necessary to temporarily raise the height of the diversion dam about 18 inches by means of stop logs pinned to the crest.

Power plant.—The power plant was operated practically without interruption during the year, and power supplied under contract to the towns of Payson, Spanish Fork, Springville, and Salem and to several companies and individuals. No. 1 generator unit of the power plant was thoroughly overhauled and outside thrust bearings and new water wheels and shafts were installed in accordance with plans of the Denver office. Both exciter units were also overhauled during the year, and at the end of the fiscal year the entire power plant had been altered and outside thrust bearings, new water wheels, shafts, and wicket gates put in all units. Contract was made during the year between the United States and Keeler Electric Co. for furnishing power to a small community on Salem Bench.

Transmission lines.—Transmission lines were operated successfully throughout the year and only a few repairs were necessary to keep the lines in good running order.

TELEPHONE LINES.

The telephone lines were in good service throughout the year. During July extensive repairs to the telephone line between Diamond Switch and East Portal were made and the line relocated in several places and new poles put in where necessary.

HYDROMETRY.

The usual hydrometric investigations were carried on for the purpose of keeping up to date the records of all the streams heretofore measured and which are connected with the water supply of the project. Ten regular gaging stations were maintained throughout the year and nine a part of the year. Altogether 138 current-meter measurements were made. One hydrographer with automobile carried on the work and supervised the delivery of stored water to the various divisions under the project in accordance with their demand. Investigations of the silt conditions in the Spanish Fork River, Mapleton Lateral, and High Line Canal were continued during the irrigation season of 1920, and results showed a considerable lessening in the amount of silt carried as compared to previous years.

FARM UNITS.

Approximately 40 water-right applications were received during the year, of which 23 were applications from new lands, and 17 supplemental covering increase in water.

WATER DELIVERIES.

The area irrigated in 1920 was approximately 47,300 acres. Of this total, 21,000 acres were under the High Line Division, 16,300 under the Spanish Fork and Lake Shore Divisions, and 10,000 acres under the Mapleton and Springville Irrigation Districts. Altogether 69,100 acre-feet of stored water were delivered at the head works of the several canals of the project during the irrigation season of 1920. Of this amount the High Line Division used 44,000 acre-feet, the Spanish Fork and Lake Shore Divisions, 18,000 acre-feet, and the Mapleton and Springville Divisions, 7,100 acre-feet.

Owing to an abundant water supply during the early part of the present irrigation season, about 20,000 acre-feet of free water were distributed to the High Line and Mapleton Divisions from flood waters of the Spanish Fork River.

MISCELLANEOUS WORK.

Cooperative weather reports were kept on the project at Provo, the United States Reclamation Service power plant at the mouth of Spanish Fork Canyon and East Portal of Strawberry Tunnel.

Historical review, Strawberry Valley project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	[1] 10,000	28,000	30,000	34,000	45,000	50,000
Acreage irrigated	[1] 5,000	25,000	28,147	32,539	44,300	[2] 45,450
Miles of canal operated	9.3	9.3	9.3	9.3	9.3	9.3
Water diverted (acre-feet)	9,000	35,000	61,300	55,242	70,467	69,100
Water delivered to land (acre-feet)[1]	6,750	29,500	51,750	46,250	59,125	57,900
Per acre of land irrigated (acre-feet)	1.35	1.18	1.84	1.42	1.33	1.27

[1] Estimated.
[2] Including High Line, Spanish Fork, and Lake Shore Divisions and Mapleton and Springville Irrigation Districts.

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 23.

IRRIGATION DISTRICTS AND CITY WATER SUPPLY.

Springville Division, Springville Irrigation District.—This district was duly organized under the State laws and two contracts executed between it and the United States under dates of December 29, 1917, and April 9, 1920. Under these contracts the United States agrees to furnish the district 4,400 acre-feet of water annually for irrigation purposes.

Mapleton Division, Mapleton Irrigation District.—This district was duly organized under the State laws and three contracts executed between it and the United States under dates of January 2, 1918, April 5, 1919, and October 28, 1919. Under these contracts the United States agrees to furnish the district 5,175 acre-feet of water annually for irrigation purposes. Negotiations are again in progress for the purchase of an additional 200 acre-feet of water at $60 per acre-foot.

Payson City.—Two contracts dated January 8, 1917, and December 18, 1919, have been entered into between Payson City and the United States for the purchase of 1,400 acre-feet of water for irrigation and domestic purposes.

Spanish Fork City.—Two contracts dated April 28, 1917, and August 21, 1918, have been entered into between Spanish Fork City and the United States for the purchase of 440 acre-feet of water for irrigation and domestic purposes.

Spanish Fork Canyon Division, Diamond Fork, Part One.—Three contracts have been entered into between certain land owners along Diamond Fork and Spanish Fork Rivers above the United States Reclamation Service diversion dam and the United States dated June 18, 1916, and September 26, 1916, for the purchase for exchange of 110 acre-feet of water for irrigation purposes under the Warren Act.

Spanish Fork Canyon Division, Clinton, Part Two.—Two contracts were entered into between the landowners near Clinton and the United States dated June 1, 1915, and July 22, 1919, for the purchase for exchange of 924.9 acre-feet of water for irrigation purposes under the Warren Act.

Spanish Fork Canyon Division, Soldier Fork, Part Three.—Two contracts were entered into between the landowners along the Soldier Fork and the United States dated December 15, 1916, and July 16, 1918, for the purchase for exchange of 122.5 acre-feet of water for irrigation purposes under the Warren Act.

Miscellaneous.—Contract was executed between Arthur Daley et al. and the United States and also John B. McMillan and the United States for the purchase for exchange under the Warren Act of 270 acre-feet of water and 117 acre-feet of water, respectively.

GRAZING LANDS.

Strawberry Valley grazing lands.—The 60,160 acres of grazing land in Strawberry Valley were leased on November 26, 1920, for a period

of five years to the Strawberry High Line Canal Co., of Payson, Utah, a corporation representing a majority of the water users of the project, who in turn subleased 46,200 acres to the Strawberry Grazing Co., a corporation consolidating the Heber Horse and Cattle Growers' Association and the Wallsburg Live Stock Association, the previous lessees of these grazing lands. During the season of 1920 an average of 12,500 head of sheep, cattle, and horses were supported on these grazing lands.

West Mountain grazing lands.—On January 18, 1918, 5,250 acres of land lying on and along the slopes of West Mountain in T. 8 S., R. 1 E., Salt Lake base and meridian, were leased to Olof G. Peterson and John L. Ellertson for $105 per year for five years. This land is used to lamb sheep on or for grazing sheep and cattle during the early spring.

Goshen Valley grazing lands.—The contract dated July 17, 1917, between certain Goshen individuals and the United States for the leasing of 5,600 acres of land for grazing purposes at $1,511 per year was canceled for nonpayment of lease price and the land re-leased to C. F. Dixon for a period of one year for $325. Just before the expiration of this last contract, the previous contractors petitioned for reinstatement of their lease by payment of the difference between the two contract prices. This was done and a supplemental contract was entered into April 15, 1919, which renewed the old contract in the entirety.

The following statement shows grazing leases now in force:

Grazing leases, Strawberry Valley project, Utah.

Name.	Date of lease.	Date of expiration of lease.	Value of of lease.	Acreage of lease.
Strawberry Valley lands	Nov. 26, 1920	Dec. 31, 1925	$10,500.00	8,320
Do	do	do	62,125.00	51,680
Goshen Valley lands	July 10, 1917	May 1, 1922	7,555.00	5,600
West Mountain lands	Jan. 18, 1918	Feb. 1, 1923	525.00	5,250
Goshen Gun Club	Jan. 10, 1919	Feb. [1] 1, 1921	120.00	1,819
Total			80,825.00	72,669

[1] Canceled at request of lessees as of Jan. 31, 1921.

DRAINAGE DISTRICTS.

There are under the Strawberry Valley project five drainage districts duly organized under the State laws of Utah, as follows: Utah County Drainage District No. 1, embracing approximately 3,000 acres west of Springville City; North Lake Shore Drainage District, embracing 630 acres on the west side of Spanish Fork River north of the town of Lake Shore; Lake Shore Drainage District, embracing about 3,100 acres on the west side of Spanish Fork River in the vicinity of the town of Lake Shore; Benjamin Drainage District, embracing 4,600 acres west and south of the town of Benjamin; Utah County Drainage District No. 4, embracing about 8,000 acres lying along Payson Slough and Beer Creek north of the towns of Payson and Salem and south of Benjamin District. A new drainage district is contemplated embracing lands between Utah County Drainage District No. 1 and Lake Shore Drainage District

for drainage of lands lying along the east side of Spanish Fork River, northwest of the town of Spanish Fork. A petition for the formation of this drainage district was being circulated among the landowners, and its successful organization is expected. North Lake Shore and Lake Shore Drainage Districts have completed their drainage work. Work is at present being done on the Benjamin District, approximately half of which has been drained. Engineering work and estimates have been prepared for Utah County Drainage District No. 4, and work will start on the drainage of lands under this district in the fall of 1921. The following tabulation shows results of drainage work accomplished on the project as of June 30, 1921:

Summary of drainage work to June 30, 1921.

Drainage district.	Constructed drains to date (tile).	Total area in district.	Estimated area protected by constructed drains.	Area yet to be drained.	Open drains constructed to date.
	Miles.	*Acres.*	*Acres.*	*Acres.*	*Miles.*
Utah County No. 1	25.8	3,022	3,022	0	4.3
North Lake Shore	8.8	631	631	0	3.6
Benjamin	10.3	4,628	2,128	2,500	4.7
Lake Shore	13.0	3,050	3,050	0	8.2
Total	57.9	11,331	8,831	2,500	20.8

List of power contracts, Strawberry Valley project, Utah.

Names of contractors.	Date of contracts.	Expiration of contracts.	Estimated maximum demand.
			Kilowatts.
Spanish Fork City	Feb. 5, 1919	Feb. 5, 1922	150
Payson City	do	do	120
Springville City	July 26, 1920	July 26, 1923	125
Town of Salem	Feb. 5, 1919	Feb. 5, 1922	40
Mapleton Light & Power Co	May 31, 1919	May 31, 1924	5
Springville Canning Co. (canceled)	June 19, 1919	Dec. 31, 1920	5
Joseph Lucas	Feb. 21, 1919	Feb. 21, 1922	5
Castilla Hot Springs Co	Sept. 6, 1919	Sept. 6, 1924	10
Keeler Electric Co	Apr. 9, 1921	Apr. 9, 1926	5

SETTLEMENT.

There is on the project practically no Government land susceptible of irrigation under existing units. All Government land opened for entry June 20, 1917, has been entered except for two small isolated tracts embracing 38 acres, 25 acres of which are regarded as pumping area.

Settlement and colonization features have never existed on this project, as practically all the land was settled and in private ownership prior to the construction of the project. Commercial and community development since the completion of the project has been marked. New homes, business blocks, and numerous civic improvements of all kinds have been going on steadily since 1915.

Settlement data, Strawberry Valley project, by calendar years.

Item.	1900	1910	1920
Total number of farms on project	2,500	2,700	3,000
Population of	5,000	5,500	7,000
Number of irrigated farms	2,000	2,200	2,700
Operated by owners or managers	1,700	1,900	2,200
Operated by tenants	300	300	500
Population of	4,500	4,500	6,500
Number of towns	11	11	12
Population of	12,600	14,000	16,000
Total population of towns and farms	17,600	19,500	23,000
Number of public schools	19	20	22
Number of churches	20	20	23
Number of banks	3	4	6
Total capital stock	$150,000	$175,000	$285,000
Total amount of deposits	$375,000	$600,000	$2,180,000
Total number of depositors	2,800	5,200	9,830

PRINCIPAL CROPS.

As a whole, the water users on the project have had a fairly prosperous year. Crop yields were normal, but the prices received by the farmers for their products were considerably lower than during the season of 1919, so that the returns per acre, though almost the same as for the previous year, were due almost entirely to increase in crop yields rather than to the prices received.

The beginning of the present irrigation season was cold and wet, retarding the growth of the majority of crops, but extremely hot and dry weather during June stimulated crop growth and abundant yields of hay, grain, and sugar beets are expected. A killing frost on April 27 materially cut down the yield of cherries, apricots, and small fruits.

Sugar-beet raising is one of the most important industries among the farmers on the project, and three sugar factories have been built on the project to handle the production.

Crop report, Strawberry Valley project, Utah, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	8,470	Ton	26,000	3.1	$16.00	$416,032	$49
Alfalfa seed	9	Bushel	50	6.0	15.00	810	90
Apples	68	...do	5,950	87.5	1.25	7,440	109
Barley	353	...do	15,138	42.9	.90	13,624	39
Beans	11	...do	69	6.3	5.00	345	31
Beets (sugar)	6,263	Ton	73,480	11.7	12.00	881,800	141
Cane	14	...do	151	10.8	15.00	2,265	162
Cherries	36	Pound	28,760	799.0	.075	2,157	60
Clover hay	118	Ton	133	1.1	14.00	1,862	16
Clover seed	70	Bushel	535	7.6	15.00	8,025	115
Corn fodder	375	Ton	1,950	5.2	6.00	11,700	31
Corn seed	115	Bushel	2,953	25.7	.90	2,658	23
Ensilage	77	Ton	812	10.5	10.00	8,120	105
Fruits, small	34				.14	6,822	201
Garden	332					17,732	53
Hay	369	Ton	432	1.2	14.00	6,048	16
Melons	13					1,650	127
Millet seed	3	Bushel	80	26.7	2.50	200	67
Milo maize	5		100	20.0	.90	90	18
Oats	1,462	Bushel	58,245	39.8	.60	34,947	24
Pasture	1,869					20,570	11
Peaches	250	Bushel	26,321	105.3	2.00	52,642	211
Peas	68	Ton	68	1.0	35.00	2,380	35
Potatoes, white	359	Bushel	42,366	118.1	.75	31,774	89
Potatoes, sweet	2	...do	190	95.0	2.00	380	190

Crop report, Strawberry Valley project, Utah, 1920—Continued.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Rye	59	Bushel	694	11.8	$1.50	$1,041	$18
Squash	2	Ton	35	17.5	7.00	245	122
Tomatoes	4	Bushel	391	97.8	1.00	391	98
Wheat	8,440	do	235,512	27.9	1.75	412,150	49
Total cropped	29,250	Total and average				1,945,900	66.50
Irrigated, no crop	3,100						
Total irrigated	32,350						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	32,981	2,400	100
Total irrigated area farms reported	32,350	.....	98
Under water-right applications (private)	25,022	.....	74
Under rental contracts (special)	8,601	.....	26
Total crop area farms reported	29,250	2,400	89

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, FEBRUARY 15, 1921.

1. In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement of the annual operation and maintenance charges for the irrigation season of 1921 and thereafter until further notice for all lands of the Spanish Fork, Lake Shore, High Line, and Power Canal Divisions of the Strawberry Valley project, Utah, under public notice, is hereby made as follows:

2. **Spanish Fork and Lake Shore Divisions.**—The minimum annual operation and maintenance charge for the Spanish Fork and Lake Shore Divisions shall be 90 cents per irrigable acre whether water is used or not, which charge will entitle the water user to not more than 1 acre-foot of water per irrigable acre and in no event to more than the amount per acre specified in the water-right application; and for all additional water covered by water-right application or contract a charge of 90 cents per acre-foot will be made. For all additional water not covered by water-right application or contract a charge of $1.50 per acre-foot will be made; provided, that no additional water will be furnished to any water user who has not made water-right application for at least 2 acre-feet of water per irrigable acre for all irrigable land owned by him.

3. **High Line Division.**—The minimum annual operation and maintenance charge for the High Line Division shall be $1.80 per irrigable acre whether water is used or not, which charge will entitle the water user to not more than 2 acre-feet of water per irrigable acre; and for all additional water covered by water-right application or contract a charge of 90 cents per acre-foot will be made. For all additional water not covered by water-right application or contract a charge of $1.50 per acre-foot will be made; provided, that no additional water will be furnished to any water user who has not made water-right ap-

plication for at least 2 acre-feet of water per irrigable acre for all irrigable land owned by him. The terms and conditions both as to amount and place of measurement for delivery of water shall be the same for public lands included in the public notice of May 21, 1917, as for all other lands under this division, namely, the delivery of 2 acre-feet per acre measured at the lead of the High Line Canal.

4. **Power Canal Division.**—The minimum annual operation and maintenance charge for the irrigation season of 1921 and thereafter until further notice for all lands of the Power Canal Division shall be $2.50 per irrigable acre whether water is used or not, which will entitle the water user to not more than 2 acre-feet of water per irrigable acre.

5. **Time of payment.**—All operation and maintenance charges will be due and payable on December 1 of each year for the preceding irrigation season, except that all charges for water additional to the amount specified in the water-right application are payable in advance when the water is ordered.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Strawberry Valley project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$1,583.91
Inventory of materials and supplies on hand			19,638.23
Plant and equipment in use			9,068.10
Current accounts receivable			23,2[illegible]7.21
Construction charges not due			2,812,957.76
Construction cost of works		$3,489,814.80	
Operation and maintenance during construction		12,511.90	
Gross construction cost		3,502,326.70	
Less revenues and adjustments during construction period		21,499.74	
Net construction cost			3,480,826.96
Operation and maintenance cost under public notice		287,954.64	
Less revenue and adjustments		163,162.62	
Deficit to Dec. 31, 1920	$18,256.57		
Net cost Jan. 1 to June 30, 1920	106,535.45		
			124,792.02
Investment items in transit			169.52
Total debits			6,472,273.71

CREDITS.

Current accounts payable			4,363.65
Contingent and deferred liabilities			1,583.91
Resources for repaying cost of project			3,069,950.23
Revenues held in reserve			105,834.18
Investment:			
Disbursements and transfers from other projects		$4,154,583.65	
Items in transit		169.52	
Total		4,154,753.17	
Less collections and transfers to other projects		864,211.43	
Net investment			3,290,541.74
Total credits			6,472,273.71

Construction cost and revenue, Strawberry Valley project.

Principal features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys, project as a whole	[1] $3,830.83	$48,658.27
Storage system		1,699,415.52
Canal system:		
Main distribution and power canal		379,279.75
High Line Canal		435,426.20
Total canal system		814,705.95
Lateral system:		
High Line Division Laterals		575,561.28
Mapleton Lateral	165.00	131,575.80
Total lateral system	165.00	707,137.08
Power system	[1] 406.56	81,597.86
Farm units		9,025.68
Permanent improvements		115,223.25
Telephone system		14,051.19
Operation and maintenance during construction		12,511.90
Gross construction cost to June 30, 1921	[1] 4,072.39	3,502,326.70
Less construction revenue earnings:		
Rentals of buildings	3,106.85	8,782.65
Rentals of irrigation water		400.00
Contractors' freight refunds		691.61
Rental of grazing lands	[1] 4,129.79	41,534.77
Other revenues, unclassified		1,534.36
Doubtful accounts	5.50	[1] 18.80
Loss on hospital operations	[1] 1,644.20	[1] 6,279.66
Net power losses (prior to public notice)		[1] 25,145.19
Total	[1] 2,661.64	21,499.74
Net construction cost, June 30, 1921	[1] 1,410.75	3,480,826.96

[1] Contra.

Operating cost and revenue for calendar year 1920 and to Dec. 31, 1920, Strawberry Valley project.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Storage works	$8,546.28	$31,412.35	$39,958.63	$34,078.22	$57,112.87	$91,191.09
Canal system	4,266.73	897.76	5,164.49	17,195.18	20,520.69	37,715.87
Lateral system				970.21	2,524.66	3,494.87
Permanent improvements		6,323.93	6,323.93		18,365.42	18,365.42
Miscellaneous expense	5,635.90		5,635.90	30,057.99		30,057.99
Total costs	18,448.91	38,634.04	57,082.95	82,301.60	98,523.64	180,825.24
REVENUES.						
Operation and maintenance repayments under contracts with water users:						
Charges due			55,694.61			153,335.89
Interest and penalties			297.02			677.07
Water rentals						7,988.39
Rentals of buildings			[1] 2,371.50			
Other revenues, unclassified			2,742.67			6,087.94
Discounts (deduct)			[1] 1,850.94			[1] 5,520.62
Total revenues			54,511.86			162,568.67
Difference, deficit			2,571.09			18,256.57

[1] Contra.

Cost by calendar years, Strawberry Valley project.

	Construction.			Operation and maintenance.	Grand total.
	Original.	Operation and maintenance during.	Total.	Gross.	
Year ending Dec. 31—					
1907	$358,107.73		$358,107.73		$358,107.73
1908	259,775.33		259,775.33		259,775.33
1909	180,788.62		180,788.62		180,788.62
1910	211,322.05		211,322.05		211,322.05
1911	482,151.37		482,151.37		482,151.37
1912	680,923.83		680,923.83		680,923.83
1913	156,205.60		156,205.60		156,205.60
1914	38,258.06	$9,765.05	48,023.11		48,023.11
1915	746,220.44	2,746.85	748,967.29	$4,180.47	753,147.76
1916	194,074.66		194,074.66	22,179.90	216,254.56
1917	48,987.28		48,987.28	30,697.72	79,685.00
1918	126,370.73		126,370.73	28,792.96	155,163.69
1919	6,284.10		6,284.10	37,891.24	44,175.34
1920				57,082.95	57,082.95
Jan 1 to June 30, 1921	345.00		345.00	107,129.40	107,474.40
Total	3,489,814.80	12,511.90	3,502,326.70	287,954.64	3,790,281.34

Cost by fiscal years, Strawberry Valley project.

	Construction.			Operation and maintenance.	Grand total.
	Original.	Operation and maintenance during.	Total.	Gross.	
Year ending June 30—					
1906	$45,409.35		$45,409.35		$45,409.35
1907	88,401.94		88,401.94		88,401.94
1908	292,288.51		292,288.51		292,288.51
1909	256,119.01		256,119.01		256,119.01
1910	172,432.90		172,432.90		172,432.90
1911	272,407.12		272,407.12		272,407.12
1912	605,421.36		605,421.36		605,421.36
1913	493,084.95		493,084.95		493,084.95
1914	114,166.72	$2,798.68	116,965.40		116,965.40
1915	389,975.33	9,713.22	399,688.55		399,688.55
1916	377,203.63		377,203.63	$11,372.39	388,576.02
1917	260,762.18		260,762.18	25,132.68	285,894.86
1918	75,690.86		75,690.86	35,064.62	110,755.48
1919	36,958.41		36,958.41	31,642.02	68,600.43
1920	9,147.53		9,147.53	45,146.98	54,294.51
1921	345.00		345.00	139,595.95	139,940.95
Total	3,489,814.80	12,511.90	3,502,326.70	287,954.64	3,790,281.34

Statement of general expense for fiscal year 1921, and to June 30, 1921, Strawberry Valley project.

Offices.	Fiscal year 1921.		To June 30, 1921.		
	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$2,928.42	$2,928.42	$91,006.07	$9,705.56	$100,711.63
Project office	10,560.00	10,560.00	214,581.86	30,402.01	244,983.87
Denver office	1,347.60	1,347.60	8,879.90	3,887.21	12,767.11
District counsel's office	1,349.37	1,349.37	8,627.11	3,463.06	12,090.17
Other offices and miscellaneous			15,392.94	1,117.25	16,510.19
Total	16,185.39	16,185.39	338,487.88	48,575.09	387,062.97
Percentage of general expense to gross cost	11.6	11.6	9.7	16.2	10.2

WASHINGTON, OKANOGAN PROJECT.

CALVIN CASTEEL, project manager, Okanogan, Wash.

LOCATION.

County: Okanogan.
Townships: 33 to 34 N., Rs. 25 to 27 E., Willamette meridian.
Railroad: Great Northern (branch line).
Project cities and towns and estimated population, June 30, 1921: Okanogan, 1,115; Omak, 560; Riverside, 210.

WATER SUPPLY.

Source of water supply: Salmon Creek.
Area of drainage basin: 121 square miles above Conconully Dam.
Annual run-off in acre-feet of Salmon Creek, near Okanogan (140 square miles), 1903 to 1920, maximum 56,500, minimum 5,200, mean 26,600.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which Service is prepared to supply water, season of 1921: 8,200 acres.
Area under water-right applications, rental and vested water-right contracts to June 30, 1921: 8,470 acres.
Length of irrigation season, May 1 to October 1: 153 days.
Average elevation of irrigable area: 1,000 feet above sea level.
Rainfall on irrigable area: At Omak, Wash., 11-year average, 11.55 inches; 1920, 10.57 inches. At Conconully, Wash., at base of Salmon River watershed, 21-year average, 15.08 inches; 1920, 17.04 inches. Unusually heavy precipitation at Conconully for 1920 was due to heavy local rain in June.
Range of temperature on irrigable area for past 7 years: Average highest temperature, 108° F.; average lowest temperature, −10° F.
Character of soil of irrigable area: Volcanic ash and gravel on upper benches and sand and gravel on lowlands along Okanogan River.
Principal products: Fruit, hay, grain, and vegetables.
Principal markets: States east.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: November 12, 1908; March 12 and April 8, 1910; February 23 and March 28, 1911; April 29 and July 6, 1912; March 10 and June 16, 1913; January 16 and September 24, 1914; March 20, May 15, and July 28, 1915; March 16, 1916; April 18, 1917; March 19, May 18, August 29, and September 10, 1918; April 26, 1919; March 3, 1921.
Location of lands opened: Tps. 33 and 34 N., Rs. 25 to 27 E., Willamette meridian.
Limit of area of farm units: Public, 40 acres; private, 40 acres.
Duty of water: 2½ acre-feet per acre per annum at the farm.
Building charge per acre of irrigable land: $95, subject to credit of $16 per acre in certain cases where landowners constructed and operate and maintain their own ditches.
Annual operation and maintenance charge: Effective for the season of 1921, and thereafter until further notice, by public notice dated March 3, 1921, the annual operation and maintenance charge within the Okanogan Irrigation District is a minimum of $4 per irrigable acre, whether water is used thereon or not, which entitles the water user to 1 acre-foot of water delivered at his land, additional water being furnished at the rate of $1.50 for the first acre-foot and all further supply at $3 per acre-foot. For lands outside the District the minimum charge per irrigable acre is $6, whether water is used or not.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers, October 9, 1905.

Construction authorized by Secretary, December 2, 1905.
First irrigation by Reclamation Service, season of 1908.
Conconully Dam completed August, 1910.
Water surface in Conconully Reservoir reached spillway crest for first time on May 19, 1914.
Power and pumping system completed, 1916.
Concrete lining of canals and extension of distribution system completed, 1917.
Third unit opened, 1917.
Supplemental construction approved, November, 1918.
Project 96 per cent completed, June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Okanogan project provides for the storage of water in Conconully Reservoir and Salmon Lake Reservoir, controlled by Conconully Dam on Salmon Creek, about 1 mile below Conconully, Wash., and Salmon Lake Dam on Salmon Lake, in east part of Conconully, Wash.; the control of Salmon Lake Reservoir by a short feeder canal from Salmon Creek and outlet works; the control of Conconully Reservoir by means of an outlet tunnel discharging into Salmon Creek below the storage dam; the diversion of water from Salmon Creek by a dam about 12 miles below the reservoir into a canal system watering lands in the valley of the Okanogan River between Riverside and Okanogan, Wash.; the operation of a pumping plant to supplement the gravity supply of the project by pumping from the Okanogan River to approximately 600 acres of land on the sandy portion of the project known as Robinson Flat, where the duty of water is less than on the heavier soils. The power for the pumping in past years has been generated by two power plants constructed at drops Nos. 1 and 2 on the upper main lateral and transmitted to the pumping station near the town of Omak, Wash., by 5½ miles of transmission line. This pumping plant was originally intended to be operated only during the years when the gravity supply of water was not sufficient, but developments have shown it to be necessary to operate the same almost continuously during most irrigation seasons. Owing to the fact that the cancellation of sandy land water rights has curtailed the water in the main canal, a contract has been entered into with the Okanogan Valley Power Co. for electric power with which to operate the pumping plant, and the power plants are not operated at the present time.

The features of the project, covered by original construction, consisting of the inlet and outlet works, Salmon Lake, Conconully hydraulic filled dam, spillway and outlet works, the diversion weir and distribution system, are completed and have been in use during irrigation seasons since 1910. The features of the project covered by supplemental construction, consisting of Salmon Lake Reservoir and Duck Lake pumping plant, are in course of construction and will be completed during the summer of 1921.

The emergency measures taken on account of the extreme water shortage for 1920 consisted of the installation of an oil-engine driven generating plant near Omak, Wash., to generate power to run one unit of Robinson Flat pumping plant. A number of wells were also sunk from which water was pumped into the lateral system and two pumping plants were operated at Salmon Lake. Two small pumping plants were installed and operated at Riverside, Wash. None of these plants is in operation at the present time and, with the exception of the plant at Salmon Lake, all are being dismantled and the machinery offered for sale.

SUMMARY OF GENERAL DATA FOR OKANOGAN PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete (estimated)		8,200
Public land entered to June 30, 1921	867	
Other private land June 30, 1921	7,333	
Acreage Service could have supplied in season of 1920		8,200
Estimated acreage Service can supply in season 1921		8,200
Estimated acreage Service can supply in season 1922		8,200
Acreage irrigated season of 1920		5,440
Acreage cropped under irrigation season of 1920		4,920
Crops:		
Value of irrigated crops season of 1920		$431,200.00
Value of irrigated crops per acre cropped		87.70

Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$666,000.00	
Miscellaneous collections and transfers issued	5,715.37	
Increase of compensation	16,243.63	
Total amount authorized		$687,959.00
Encumbrances—		
Disbursements and transfers received	204,533.08	
Current liabilities	26,831.62	
Increase of compensation	16,247.46	
Total encumbrances		247,612.16
Unencumbered balance as of July 1, 1921		440,346.84
Fiscal year 1922—		
Amount specified in appropriation act		33,000.00
Fiscal year 1923—		
Amount specified in appropriation act		33,000.00
Fiscal year 1923—		
Proposed appropriations		40,000.00
Inventories:		
Value of stock on hand		9,988.61
Value of plant and equipment in use		28,864.79
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$1,290,454.30	
Less revenues and adjustments	56,017.45	
Net cost to June 30, 1921		1,234,436.85
Per cent completed on June 30, 1921	96	
Estimated per cent completed on June 30, 1922	100	
Estimated per cent completed on June 30, 1923	100	
Value of construction water-right contracts and other resources to repay net cost or project		1,303,956.13
Revenues held in reserve		1,264.27
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$336,366.98	
Less charges due and miscellaneous revenues	219,443.76	
Deficit		116,923.22

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges	$47,648.11	$34,407.99	.....	.....	$34,407.99	$13,240.12
Operation and maintenance charges (public notice)	158,194.82	118,890.24	$356.03	$1,984.93	121,231.20	36,963.62
Rentals, irrigation water	109,565.87	105,449.89	.....	2,273.24	107,723.13	1,842.74
Rentals, power	1,754.71	1,754.71	.....	.....	1,754.71	.....
Rentals, grazing and farm lands	586.50	586.50	.....	.....	586.50	.....
Miscellaneous	18,130.20	16,693.41	.....	.....	16,693.41	1,436.79
Total	335,880.21	277,782.74	356.03	4,258.17	282,396.94	53,483.27

CONSTRUCTION DURING FISCAL YEAR.

Salmon Lake Dam.—The construction of this dam by Government forces has been continued except for three months in the winter, and on June 30, 1921, the dam and outlet works were 85 per cent completed. The feeder canal and the highway around Salmon Lake Reservoir were practically completed. The feeder canal was operated after May 20, 1921, and the highway was nearly all opened to traffic. The average force employed has been about 75 men and 60 head of horses. It is estimated that this dam and all related features should be completed in September, 1921.

Conconully Dam enlargement.—This work was completed except for the permanent spillway crest, the construction of which has been postponed. A temporary wooden flashboard structure was built,

raising the crest height 3 feet. The top of the original dam was also raised 3 feet by building a concrete wall rising from the puddle core and filling behind the wall.

Pumping for irrigation.—In addition to measures taken during the fiscal year 1920 to relieve the extreme water shortage, a small pumping plant was installed at a well in Spring Coulee, near Okanogan, Wash., and two small plants were installed at Riverside, Wash., for pumping from the Okanogan River. All of these plants were operated by 15-horsepower oil engines. The engine from the Duck Lake pumping plant was moved temporarily to Salmon Lake about the middle of the irrigation season of 1920 and a small additional plant driven by a 25-horsepower oil engine installed to increase the capacity of the Salmon Lake pumping plant for the remainder of the season.

OPERATION AND MAINTENANCE.

The last part of the irrigation season of 1920 was much worse than the first half. The weather was extremely dry and hot and little water except what was pumped was available. Eleven pumping plants were erected and operated during the season. The run-off of Salmon Creek for the year 1920 amounted to 5,184 acre-feet, which was the lowest recorded run-off since April, 1903. With much private pumping the project pulled the orchards through with little loss of trees, but with a large loss of crop. The gravity water was run in periods in order to conserve as much as possible. The lands under the Robinson Flat pumping plant received 1.25 acre-feet. The subscribed rights under the gravity system received only 0.28 acre-foot. This, in most cases, was augmented by private pumping or by seasonal transfers of water. The winter of 1920–21 was mild but stormy, the snowfall was large, and all of the snow water on the project lands went into the ground, leaving the orchards in good shape in the spring. Water was turned into the canals for the first irrigation in 1921 on May 11 and was continued through May and June. The run-off was not so large as was anticipated for May and June. The highest level reached by the water in Conconully Reservoir was one and one-half feet below the old spillway crest on June 10 and the water began to recede on June 13. At the same time Salmon Lake was filled up to the gate sill. This required about 3,600 acre-feet. At the end of June there was in storage 12,600 acre-feet.

Historical review, Okanogan project, by calendar years.

Item.	1916	1917	1918	1919	1920
Acreage for which the Service was prepared to supply water	10,099	10,099	10,099	10,099	[1] 8,200
Acreage irrigated	7,850	8,000	6,402	5,849	5,440
Miles of canal operated	77	79	79	79	79
Water diverted (acre-feet)	25,947	25,182	8,827	13,837	8,435
Water delivered to land (acre-feet)	19,615	19,801	6,339	9,967	5,259
Per acre of irrigated land (acre-feet)	2.50	2.49	0.99	1.70	0.96

[1] Reduction due to elimination of sandy lands.

SETTLEMENT.

The number of changes in ownership was limited and only trades were made. A few water users purchased the permanent use of

vested water rights and had it transferred to their land. The average price received for the apple crop, together with a short crop, left the farmers in bad condition financially.

The land-investment report compiled at the close of the season of 1920 shows a total gross land value for the project of $4,670,900, or about $730 per acre for the area cleared and leveled. The total value of stock and equipment is approximately $68,750, or about $106 per acre, based on area cleared and leveled. Some development was done during the year. Many home packing sheds and storehouses were built and a large number of trucks were purchased.

Settlement data, Okanogan project, by calendar years.

Item.	1917	1918	1919	1920
Total number of farms on project	560	594	594	594
Population	1,050	1,162	1,147	1,150
Number of irrigated farms	475	401	407	400
Operated by owners or managers	465	378	361	350
Operated by tenants	10	23	46	50
Population	1,050	1,162	1,147	1,150
Number of towns	3	3	3	3
Population	1,250	1,400	1,520	1,885
Total population in towns and on farms	2,300	2,562	2,667	3,035
Number of public schools	7	7	7	5
Number of churches	8	8	8	8
Number of banks	4	4	5	5
Total capital stock	$135,000	$135,000	$160,000	$155,000
Amount of deposits	$450,000	$500,000	$600,000	$1,050,100
Number of depositors	1,700	1,750	1,800	2,100

PRINCIPAL CROPS.

The area cropped during the year was 4,920 acres, and the total value of the crops produced was $431,200, or $87.70 per acre cropped. The decrease in acreage cropped was due to the extreme drought during 1920, as practically all of the water was used on the orchards. Apples constitute the principal crop. The crop was short and of poor quality for 1920. At the end of the year the 1921 crop gave promise of good returns.

Crop report, Okanogan project, Washington, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	594	Ton	727	1.22	$26.00	$19,180	$32.29
Apples	4,164	Pound	17,931,648	4,306½	.02	358,620	86.13
Corn fodder	34	Ton	54	1.59	12.00	650	19.00
Small fruit	30	Pound	210,000	7,000	.05	10,530	345.16
Garden	81	Acre				14,380	177.47
Hay	106	Ton	108	1.02	30.00	3,240	30.57
Pasture	254	Acre			10.00	2,540	10.00
Peaches	14	Pound	86,315	6,277½	.04	3,450	251.10
Pears	47	do	285,300	6,038.1	.04	11,410	241.52
Prunes	10	do	7,960	796	.06	480	47.76
Potatoes	24	do	223,800	9,325	.03	6,710	279,75
Less duplicated areas	438						
Total cropped	4,920	Total and average				431,200	87.70
Irrigated, no crop:							
Nonbearing orchard	380						
Miscellaneous	140						
Total irrigated	5,440						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	6,418½	390	84.5
Total irrigated area farms reported	5,440	390	71.6
Under water-right applications	4,059	350	53.4
Vested water rights	1,381	40	18.2
Total cropped area farms reported	4,920	390	64.8

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, MARCH 3, 1921.

1. **Annual operation and maintenance charges for lands within Okanogan Irrigation District.**—The annual operation and maintenance charge for the irrigation season of 1921 and thereafter until further notice against all lands of the Okanogan project, Washington, under public notice, within the limits of the Okanogan Irrigation District, shall be a minimum charge of $4 per irrigable acre, whether water is used or not, which charge will permit the delivery of not to exceed 1 acre-foot of water per irrigable acre; for the first acre-foot per irrigable acre additional, the charge shall be $1.50 per acre-foot; and for further quantities the charge shall be $3 per acre-foot. All operation and maintenance charges for these lands will be due and payable each year, one-half thereof on January 15 and one-half thereof on July 1 following the irrigation season.

2. **Annual operation and maintenance charges for lands not within Okanogan Irrigation District.**—The annual operation and maintenance charge for the irrigation season of 1921 and thereafter until further notice against the lands of the Okanogan project, Washington, under public notice, not within the limits of the Okanogan Irrigation District, shall be a minimum charge of $6 per irrigable acre, whether water is used or not. All operation and maintenance charges for these lands will be due and payable on March 1 following the irrigation season.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Okanogan project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit		$182.03
Inventory of materials and supplies on hand		9,988.61
Plant and equipment in use		28,864.79
Current accounts receivable		53,483.27
Construction charges not due		1,255,039.06
Unearned value of contracts		250.88
Construction cost of works	$1,276,538.68	
Operation and maintenance added to construction	9,716.79	
Operation and maintenance during construction	4,736.36	
Unadjusted clearing accounts	[1] 567.53	
Gross construction cost	1,290,454.30	
Less revenues and adjustments during construction period	56,017.45	
Net construction cost		1,234,436.85
Operation and maintenance cost under public notice	346,113.77	
Less operation and maintenance added to construction	9,716.79	
Gross operation and maintenance cost	336,396.98	
Less revenues and adjustments	219,443.76	
Deficit to Dec. 31, 1920	$85,721.60	
Net cost Jan. 1 to June 30, 1921	31,201.62	
		116,923.22
Investment items in transit		2,060.14
Total debits		2,701,228.85

CREDITS.

Current accounts payable	30,376.96
Contingent and deferred liabilities	432.91
Resources for repaying cost of project	1,268,956.13
Revenues held in reserve	1,264.27

[1] Contra.

Investment:		
Disbursements and transfers from other projects	$1,657,172.39	
Items in transit	2,060.14	
Total	1,659,232.53	
Less collections and transfers to other projects	294,233.95	
Net investment		$1,364,998.58
Total credits		2,701,228.85

Construction cost and revenues, Okanogan project.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Original construction:		
Examinations and surveys		$4,603.27
Storage works—		
Salmon Lake Reservoir—		
Inlet Canal		1,993.00
Outlet works		6,568.52
Salmon Lake Dam		2,486.01
		11,047.53
Conconully Reservoir—		
Real estate		46,940.27
Clearing reservoir site		8,886.05
Conconully Dam		221,103.99
Spillway		37,646.39
Outlet works		24,424.19
		339,000.89
Total storage works		350,048.42
Pumping for irrigation—		
Power plant No. 1		11,923.44
Power plant No. 2		13,931.42
Pumping plant, Robinson flat		30,077.24
Total pumping for irrigation		55,932.10
Lateral system—		
Diversion weir in Salmon Creek		4,139.89
Main canal, main laterals and sublaterals		401,152.44
		405,292.33
Power system, transmission line		5,445.83
Farm units		1,889.92
Permanent improvements—		
Roads		1,105.98
Buildings		8,355.73
		9,461.71
Telephone system		6,679.10
Operation and maintenance during construction (water-rental basis)		4,736.36
Operation and maintenance added to construction		9,746.79
Total original construction		853,835.83
Supplemental construction:		
Examinations and surveys—Purchase of sandy land water rights	$12,213.39	58,413.85
Storage works—		
Salmon Lake Reservoir—		
Salmon Lake Dam	98,417.13	191,873.87
Outlet works and spillway	6,069.78	29,275.18
Outlet channel	75.61	4,217.37
Feeder canal	7,219.67	26,197.14
Roads	32,649.57	60,394.74
Land purchases		8,002.40
	144,431.76	319,960.70
Conconully Reservoir—		
Conconully Dam enlargement	21,463.29	40,345.07
Movable crest spillway	430.62	430.62
Roads	240.26	534.48
	22,134.17	41,310.17
Total storage works	166,565.93	361,270.87

Construction cost and revenues, Okanogan project—Continued.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Supplemental construction—Continued.		
Pumping for irrigation—		
Pumping at Duck Lake	$1,931.34	$12,547.26
Pumping at Salmon Lake	[1] 5,903.70	4,954.02
Power plant No. 3	[1] 22,509.96	.....
Wells Nos. 1, 2, 3, and Spring Coulee	[1] 11,541.68	.....
Pumping plant, Shell Rock	[1] 468.57	.....
Pumping at Riverside	[1] 5,354.35	.....
	[1] 43,846.92	17,501.28
Power system, transmission lines	[1] 723.46	.....
Total supplemental construction	134,208.94	437,186.00
Total cost of construction features	134,208.94	1,291,021.83
Unadjusted clearing accounts	[1] 1,558.45	[1] 567.53
Gross construction cost to June 30, 1921	132,650.49	1,290,454.30
Less revenues earned during construction period—		
Rentals of buildings	.....	224.00
Rentals of irrigation water	361.37	54,021.58
Profit on hospital operation	1,017.01	2,015.18
Losses on operations, unclassified	200.76	[1] 58.03
Field cost adjustments	[1] 185.28	[1] 185.28
	1,393.86	56,017.45
Net construction cost to June 30, 1921	131,256.63	1,234,436.85

[1] Contra.

Operating cost and revenue, Okanogan project.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Storage works	$1,610.97	$9.74	$1,611.71	$19,352.35	$3,473.96	$22,826.31
Pumping for irrigation	52,177.41	4,476.44	56,653.85	78,249.14	13,943.99	92,193.13
Lateral system	5,033.09	4,565.58	9,598.67	47,698.61	78,209.99	125,908.60
Permanent improvements	.....	709.55	709.55	.....	4,155.06	4,155.06
Total regular operation and maintenance	58,821.47	9,752.31	68,573.78	145,300.10	99,783.00	245,083.10
Supplemental construction to be repaid as operation and maintenance:						
Salmon Lake pumping plant	.....	.....	9,950.55	.....	.....	9,950.55
Salmon Lake carriage canal	.....	.....	4,069.58	.....	.....	4,069.58
Power plant No. 3	.....	.....	24,461.11	.....	.....	24,461.11
Wells	.....	.....	16,436.67	.....	.....	16,436.67
Transmission line	.....	.....	787.98	.....	.....	787.98
Riverside pumping plant	.....	.....	7,037.37	.....	.....	7,037.37
Machine shop	.....	.....	5,572.14	.....	.....	5,572.14
Subtotals	.....	.....	68,315.40	.....	.....	68,315.40
Total costs	.....	.....	136,889.18	.....	.....	313,398.50
Less unpaid operation and maintenance charges added to construction	.....	.....	.....	.....	.....	9,746.79
Balance	.....	.....	136,889.18	.....	.....	303,651.71
REVENUES.						
Operation and maintenance repayments under contracts with water users:						
Charges due	.....	.....	58,409.51	.....	.....	158,482.82
Interest and penalties	.....	.....	483.31	.....	.....	1,266.26
Water rentals	.....	.....	.....	.....	.....	55,313.09
Rentals of lands and buildings	.....	.....	420.00	.....	.....	3,221.97
Discounts	.....	.....	.....	.....	.....	[1] 354.03
Total revenues	.....	.....	59,312.82	.....	.....	217,930.11
Difference, deficit	.....	.....	77,576.36	.....	.....	[2] 85,721.60

[1] Contra. [2] $70,622.90 to be repaid in 5 years beginning 1922.

Cost by calendar years, Okanogan project.

Year ending Dec. 31—	Construction.				Operation and maintenance.			
	Construction.	Operation and maintenance added.	Operation and maintenance during.	Total.	Total original.	Less operation and maintenance added to construction.	Gross.	Grand total.
1903	$12,854.78			$12,854.78				$12,854.78
1904	5,037.06			5,037.06				5,037.06
1905	8,353.56			8,353.56				8,353.56
1906	64,175.40			64,175.40				64,175.40
1907	233,066.03			233,066.03				233,066.03
1908	106,856.55		$4,138.88	110,995.43				110,995.43
1909	84,457.58		597.48	85,055.06	$6,985.35		$6,985.35	92,040.41
1910	41,424.39			41,424.39	10,236.20		10,236.20	51,660.59
1911	8,312.40			8,312.40	17,605.94		17,605.94	25,918.34
1912	48,857.05			48,857.05	13,385.93		13,385.93	62,242.98
1913	46,820.20			46,820.20	9,640.11		9,640.11	56,460.31
1914	86,932.97			86,932.97	9,780.32		9,780.32	96,713.29
1915	48,501.61			48,501.61	11,910.35		11,910.35	60,411.96
1916	23,636.76			23,636.76	13,584.69		13,584.69	37,221.45
1917	19,583.97	$9,608.52		29,192.49	17,547.45	$9,608.52	7,938.93	37,131.42
1918	20,114.20	[1] 15.00		20,099.20	32,297.72	[1] 15.00	32,312.72	52,411.92
1919	119,396.61	153.27		119,549.88	33,535.26	153.27	33,381.99	152,931.87
1920	228,699.80			228,699.80	136,889.18		136,889.18	365,588.98
Jan. 1 to June 30, 1921	68,890.23			68,890.23	32,715.27		32,715.27	101,605.50
Total	1,275,971.15	9,746.79	4,736.36	1,290,454.30	346,113.77	9,746.79	336,366.98	1,626,821.28

[1] Contra.

Cost by fiscal years, Okanogan project.

Year ending June 30—	Construction.				Operation and maintenance.			
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	Grand total.
1903	$991.31			$991.31				$991.31
1904	14,549.91			14,549.91				14,549.91
1905	4,550.62			4,550.62				4,550.62
1906	13,739.41			13,739.41				13,739.41
1907	148,141.69			148,141.69				148,141.69
1908	195,503.16		$2,703.12	198,206.28				198,206.28
1909	97,948.99		2,033.24	99,982.23	$4,071.10		$4,071.10	104,053.33
1910	80,212.40			80,212.40	8,588.62		8,588.62	88,801.02
1911	5,513.24			5,513.24	14,783.45		14,783.45	20,296.69
1912	28,937.77			28,937.77	15,158.17		15,158.17	44,095.94
1913	41,506.18			41,506.18	12,345.65		12,345.65	53,851.83
1914	56,180.31			56,180.31	8,502.35		8,502.35	64,682.66
1915	85,926.53			95,926.53	10,313.00		10,313.00	106,239.53
1916	28,775.90			28,775.90	13,534.42		13,534.42	42,310.32
1917	24,714.54			24,714.54	13,238.20		13,238.20	37,952.74
1918	4,122.50	$9,608.52		13,731.02	24,143.87	$9,608.52	11,535.35	25,266.37
1919	64,679.05	[1] 15.00		64,664.05	34,758.02	[1] 15.00	34,773.02	99,437.07
1920	237,327.15	153.27		237,480.42	40,588.42	153.27	40,435.15	277,915.57
1921	132,650.49			132,650.49	149,088.50		149,088.50	281,738.99
Total	1,275,971.15	9,746.79	4,736.36	1,290,454.30	346,113.77	9,746.79	336,366.98	1,626,821.28

[1] Contra.

General expense, Okanogan project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$2,364.72	$3,660.04	$6,024.76	$21,507.59	$12,116.62	$33,624.21
Project office	2,755.87	4,264.70	7,020.57	49,674.92	57,135.56	106,810.48
Denver office	967.47	1,497.39	2,464.86	5,602.24	3,536.46	9,138.70
District counsel's office	768.21	1,189.02	1,957.23	9,253.26	5,294.43	14,527.69
Other offices and miscellaneous	231.39	358.13	589.52	12,921.38	5,219.06	18,140.44
Total	7,087.66	10,969.28	18,056.94	98,939.39	83,302.13	182,241.52
Percentage of general expense to gross cost	5.2	7.3	6.4	7.7	23.7	11.

WASHINGTON, YAKIMA PROJECT.

J. L. Lytel, project manager, Yakima, Wash.

LOCATION.

Counties: Yakima, Benton, Kittitas.

Townships: 8 to 22 N., Rs. 11 to 30 E., Willamette meridian.

Railroads: Northern Pacific; Chicago, Milwaukee & St. Paul; Union Pacific System; Yakima Valley Transportation Co.

Project cities and towns and estimated population June 30, 1921: Ahtanum, 100; Benton City, 100; Buena, 250; Cowiche, 25; Donald, 40; Grandview, 1,011; Granger, 503; Gromore, 25; Harwood, 25; Kennewick, 1,219; Mabton, 547; Naches, 600; Outlook, 100; Prosser, 1,640; Sunnyside, 1,900; Tieton, 25; Wiley City, 200; Yakima, 22,000; Zillah, 800.

WATER SUPPLY.

Source of water supply: Yakima River and tributaries.

Area of drainage basin: 3,550 square miles above Union Gap.

Annual run-off in acre-feet of Yakima River at Union Gap, 1897–1919: Maximum, 4,950,000; minimum, 1,760,000; mean, 3,200,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which Service is prepared to supply water, season of 1921: Sunnyside Division, 101,509 acres; Tieton Division, 32,000 acres; Wapato Division, storage capacity only, 70,000 acres; storage water sold under Warren Act contracts, 19,000 acres.

Area under water-right applications and rental contracts, season of 1921: Sunnyside Division, 101,509 acres; Tieton Division, 31,486 acres.

Length of irrigation season: Sunnyside Division, April 1 to October 31, 214 days; Tieton Division, April 20 to September 30, 164 days.

Average elevation of irrigable area: Sunnyside Division, 700 feet; Tieton Division, 1,700 feet above sea level.

Rainfall on irrigable area: At Sunnyside, 1895 to 1920, average 6.50 inches; 1920, 7.64; at Tieton, 1911 to 1920, average 8.12 inches; 1920, 7.11 inches.

Maximum temperature: At Sunnyside, 1911 to 1920, average 104° F.; at Tieton, 1911 to 1920, average 98° F.

Minimum temperature: At Sunnyside, 1911 to 1920, average −2½° F.; at Tieton, 1° F.

Character of soil of irrigable area—Sunnyside Division: On about three-fourths of the unit the soil is sandy loam or volcanic ash from 10 to 60 feet deep. The remainder is decomposed basalt, underlain by gravel, or a combination of this with the above-named soils. Tieton Division: Volcanic ash and decomposed basalt, underlain with gravel.

Principal products: Alfalfa, apples, pears, peaches, cherries, wheat, corn, potatoes, sugar beets, hops, stock, and dairy products.

Principal markets: Cities of the Northwest, British Columbia, and Alaska; fruit markets—the entire United States.

LANDS OPENED FOR IRRIGATION.

SUNNYSIDE DIVISION.

Dates of public notices: November 18, 1908; March 2, 1909; April 18, April 19, May 2, 1910; March 15, 1911; February 29, May 31, 1912; June 16, June 23, October 2, 1913; March 10, April 11, and September 24, 1914; March 31, July 27, 1915; April 6, May 31, 1916; May 16, 1917; April 4, May 6, 1918; March 11 and July 25, 1919; March 3, 1920.

Location of lands opened: Tps. 8 to 12 N., Rs. 19 to 27 E., Willamette meridian.

Duty of water: 3 acre-feet per acre per annum at the farm.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: $52 to $64.

Operation and maintenance charge 1921: Each acre of irrigable land, whether water is used thereon or not, shall be charged with a minimum operation and maintenance charge of $2, which will permit delivery of not more than the following amounts per irrigable acre: To lands of class (A), 2 acre-feet; to lands of class (B), 2½ acre-feet; to lands of class (C), 3 acre-feet. For additional water above the foregoing amounts, the rate shall be 75 cents per acre-foot: *Provided*, That for newly reclaimed lands no charge will be made for water actually needed in excess of the amount covered by a charge of $2 per irrigable acre at the said rates.

TIETON DIVISION.

Dates of public notices and orders: November 7, 1910; March 8, April 14, 1911; January 24, February 21, April 18, May 10, 1912; March 21, April 25, June 16, 1913; March 4, September 24, 1914; March 9, March 20, October 30, 1915; March 16, April 3, 1916; March 17, 1917; April 12, November 15, 1918; March 11, 1919; March 4, July 29, 1920; February 19, 1921.

Location of lands opened: Ts. 12 to 15 N., Rs. 16 to 18 E., Willamette meridian.

Duty of water: That quantity of water which shall be beneficially used for the irrigation of the lands and in no case exceed the share proportionate to irrigable acreage of water supply actually available. The average use is about 2.40 acre-feet per acre delivered at the farm.

Limit of area of farm units: Public, 40 acres; private, 160 acres.

Building charge per acre of irrigable land: $93, plus $11.63 supplemental construction.

Operation and maintenance charge 1921: For all water delivered between June 1 and August 31, inclusive, $1.75 per acre-foot, for all water delivered at other times during the irrigation season, $1 per acre-foot; with a minimum of $2 per irrigable acre whether water is used or not, which minimum amount when paid is credited upon account for water delivered at the above acre-foot rates.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys in 1903.

Report of board of engineers recommending construction October 16, 1905.

Construction of Sunnyside and Tieton Divisions authorized by Secretary, December 12, 1905; Wapato Division, June 16, 1906.

Sunnyside Canal purchased June 23, 1906.

First irrigation by Reclamation Service, Sunnyside Division, season of 1907.

Tieton diversion dam completed December, 1908.

Tieton main canal completed in 1909.

Bumping Lake Dam completed in 1910.

First irrigation by Reclamation Service, Tieton Division, season of 1911.

Tieton Division completed winter of 1911–12.

Kachess Dam completed fall of 1912.

Contract with Sunnyside Irrigation District signed October 6, 1914.

Contract with Snipes Mountain Irrigation District signed November 16, 1914.

Contract with Outlook Irrigation District signed November 23, 1914.

Construction for Sunnyside Irrigation District (Benton extension) completed April, 1916.

Construction for Outlook Irrigation District completed June 1, 1916.

Construction for Snipes Mountain Irrigation District completed June 30, 1916.

Contract with Grandview Irrigation District signed August 4, 1916. Construction completed July 31, 1917. Construction gravity system completed June 30, 1917.

Keechelus Dam completed 1917.

Contract with Prosser Irrigation District signed December 1, 1917.

Contract with Sunnyside Valley Irrigation District signed March 16, 1918.

Contract with Yakima-Tieton Irrigation District authorizing supplemental construction signed August 7, 1918.

Clear Creek Dam completed 1918.

Enlargement of Tieton main canal completed December, 1918.

Construction Prosser Irrigation District completed June 30, 1919.

Contract with Kennewick Irrigation District for surveys signed September 24, 1919. Surveys completed June 1, 1920.

Contract with Naches-Selah Irrigation District for sale of storage water signed June 17, 1920.

Contract with Yakima Valley Canal Co. for sale of storage water signed June 26, 1920.

Contract with Selah-Moxee Irrigation District for sale of storage water signed January 25, 1921.

Contract with Yakima Irrigation District (Moxee Division) for surveys signed July 1, 1920. Surveys completed December 21, 1920.

Contract with Yakima-Benton Irrigation District (Roza Division) for surveys signed August 13, 1920.

Contract with Kennewick Irrigation District for sale of water supply (diversion right) signed June 11, 1921.

Per cent completed June 30, 1921: Storage Division, 42 per cent; Sunnyside Division, 95 per cent; Tieton Division, 99 per cent.

IRRIGATION PLAN.

The irrigation plan of the Yakima project provides for the storage of flood waters of the Yakima River and its tributaries in six reservoirs, as follows: Kachess, Keechelus, and Clealum Reservoirs, located on the headwaters of the Yakima River; Bumping Reservoir, located on the Naches River watershed: Clear Creek and Tieton Reservoirs, located on the Tieton River. The plan also provides for the ultimate irrigation of seven divisions or districts, as follows: The Sunnyside Division, by diverting water from the east side of the Yakima River at Union Gap for the irrigation of 107,600 acres of land by means of the old Sunnyside Canal as improved and extended by the Reclamation Service and including pumping for the irrigation of about 15,000 acres of land, utilizing power developed at drops in the canal system: the Tieton Division by diverting water from the Tieton River for the irrigation of 32,000 acres of land situated between the Naches River and Ahtanum Creek in the vicinity of Yakima; the Wapato Division, watered by a diversion from the west bank of the Yakima River at Union Gap and comprising 120,000 acres of land on the Yakima Indian Reservation; the Yakima Irrigation District by diverting from the Tieton River for the irrigation of 36,750 acres of land lying above existing canals in the Wenas, Selah, and Moxee Valleys, all in the vicinity of Yakima: the Yakima-Benton (Roza) Division by diverting water from the Yakima River 15 miles north of Yakima for the irrigation of 60,000 acres of land lying above the Sunnyside Canal between Union Gap and Benton City; the Kennewick Division by diverting water from the Yakima River at Prosser for the irrigation by pumping of 35,000 acres of land in the vicinity of Kennewick and Kiona, in Benton County; and the Kittitas Division by diverting water from the Yakima River at Easton for the irrigation of 67,000 acres of land in the vicinity of Ellensburg, Kittitas County. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The completed features are Kachess Dam, Keechelus Dam, Bumping Lake Dam, Clear Creek Dam, the Tieton Division (completed), and the Sunnyside Division (95 per cent completed). For the Tieton Dam, wagon-road and camp construction have been completed and progress has been made on power-plant construction, driving of outlet tunnel, clearing of reservoir, and core wall.

Features for future construction are the completion of Tieton Dam, the construction of Clealum Dam, the construction of the Granger siphon district and the Mabton pumping district of the Sunnyside Division: and the construction of the Moxee, Yakima-Benton, Kennewick, and Kittitas Divisions. The Wapato Division is being constructed by the United States Indian Service.

SUMMARY OF GENERAL DATA FOR YAKIMA PROJECT TO END OF FISCAL YEAR 1921.

	Sunnyside Division.	Tieton Division.	Storage Division.	Highline Division.	Total.
Areas:					
Irrigable acreage when project is complete	107,600	32,000	.....	.....	139,600
Public land entered to June 30, 1921	2,627	2,048	.....	.....	4,675
State land unsold June 30, 1921	30	374	.....	.....	404
Indian land June 30, 1921	241	.....	.....	.....	241
Private land June 30, 1921	104,702	29,578	.....	.....	134,280
Acreage Service could have supplied season of 1920	100,733	32,000	.....	.....	132,733
Estimated acreage Service can supply in season of 1921	101,509	32,000	.....	.....	133,509
Estimated acreage Service can suppy in season of 1922	102,909	32,000	.....	.....	134,909
Acreage irrigated season 1920	93,610	28,000	.....	.....	121,610
Acreage cropped under irrigation in season of 1920	78,940	27,250	.....	.....	106,190

Summary of general data for Yakima project to end of fiscal year 1921—Continued.

	Sunnyside Division.	Tieton Division.	Storage Division.	Highline Division.	Total.
Crops:					
Value of irrigated crops, season 1920	$8,330,400.00	$3,471,400.00			$11,801,800.00
Value of irrigated crops per acre cropped	105.50	127.40			111.14
Finances:					
Appropriations fiscal year 1921—					
Amount specified in appropriation act					351,000.00
Miscellaneous collections and transfers issued					105,201.83
Increase of compensation					47,690.53
Total amount authorized					503,892.36
Encumbrances fiscal year 1921—					
Disbursements and transfers received					333,616.32
Current liabilities					11,432.58
Contingent liabilities					1,847.41
Increase of compensation					47,690.53
Total encumbrances					394,586.84
Unencumbered balance on July 1, 1921					109,305.52
Appropriations fiscal year 1922—					
Amount specified in appropriation act					2,100,000.00
Encumbrances fiscal year 1922—					
Disbursements and transfers received					117,930.95
Current liabilities					42,484.60
Contingent liabilities					13,207.50
Total encumbrances					173,623.05
Unencumbered balance as of July 1, 1921					1,926,376.95
Fiscal year 1923, proposed appropriation					1,500,000.00
Inventories:					
Value of stock on hand	14,618.25	12,335.48	$160,583.88		187,537.61
Value of plant and equipment in use	11,052.58	7,844.89	436,612.40	$7,248.81	462,758.68
Construction cost and per cent completed:					
Gross cost to June 30, 1921	3,365,528.74	3,401,565.36	3,730,761.67	166,706.87	10,664,562.64
Less revenues and adjustments	28,599.77	28,330.75	264,698.23	661.87	320,966.88
Net cost to June 30, 1921	3,336,928.97	3,373,234.61	3,466,063.44	167,368.74	10,343,595.76
Per cent completed on June 30, 1921	95	99	42		59
Estimated per cent completed June 30, 1922	95	99	46		63
Estimated per cent completed June 30, 1923	99	99	55		70
Value of construction water-right contracts and other resources to repay net costs of project	$3,749,575.84	$3,022,938.05	$2,399,406.15	$47,486.50	$9,219,406.54
Revenues held in reserve		523.75		18,510.49	19,034.24
Operation and maintenance costs:					
Gross cost to Dec. 31, 1920	1,182,329.64	471,451.18	51,914.00		1,705,694.82
Less charges due and miscellaneous revenues	1,137,120.73	461,051.98	43,396.44		1,641,469.15
Deficit	45,308.91	10,399.20	8,517.56		64,225.67

Summary of general data for Yakima project to end of fiscal year 1921—Continued.

	Sunnyside Division.	Tieton Division.	Storage Division.	Highline Division.	Total.
Drainage:					
June 30, 1921 (Government investigation)	$11,418.80				$11,418.80
Miles of drain built to June 30, 1921—					
Open	76.06	6.8			83.86
Closed	78.36	1.2			79.56
Estimated acreage damaged by seepage June 30, 1921	10,000	200			10,200
Estimated acreage protected by drains to June 30, 1921	48,400	2,068			50,468
Estimated acreage to be protected authorized system	49,510	2,068			51,578

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

	Due.	Collected.				Uncollected.
		Cash.	Discount.	Other credits.	Total.	
Construction charges	$2,551,425.41	$2,415,842.25		$26,446.87	$2,442,289.12	$109,136.29
Operation and maintenance charges (public notice)	1,661,148.01	1,545,885.85	$19,706.36	1,045.34	1,566,637.55	94,510.46
Rentals, irrigation water	131,318.78	129,819.44			129,819.44	1,499.34
Rentals, power	3,635.33	3,635.33			3,635.33	
Rentals, grazing and farming lands	19,034.24	18,141.06			18,141.06	893.18
Contractors' freight refunds	16,343.72	16,310.81			16,310.81	32.91
Miscellaneous	223,490.36	221,117.76			221,117.76	2,372.60
Totals	4,606,395.85	4,350,752.50	19,706.36	27,492.21	4,397,951.07	208,444.78

STORAGE RESERVOIRS.

CONSTRUCTION DURING FISCAL YEAR.

Clearing the Keechelus Reservoir of logs and débris was continued until November, when work was discontinued on account of bad weather. At the end of the year the work had not been resumed, as the reservoir was full. Work was done on the spillway and outlet channels.

Construction was resumed on the Tieton Reservoir and Dam in April, consisting principally in excavation of outlet tunnels and core-wall trench and stripping of the dam site. Some material was placed in the dam embankment. The sawmill was operated, cutting approximately 20,000 feet b. m. per day for camp and construction purposes. The erection of gravel and concrete plants was under way, and the camp, which had been idle since the summer of 1918, was repaired and renovated. An average of 300 men and 80 horses were employed.

OPERATION AND MAINTENANCE.

The Keechelus, Kachess, Bumping, and Clear Creek permanent reservoirs and the Clealum temporary storage works were operated during the year in connection with the Yakima project water supply.

This involves the operation of a system controlling and distributing all waters of the Yakima River system, release and control of storage waters during the irrigation season, the securing and studying of relative meteorological data, repairs at the different reservoirs, accumulation of such hydrographic data as are necessary in connection with the construction program of the Storage Reservoirs, working up Yakima Valley stream-flow records, studies of the ultimate development of the Yakima Valley, operation and maintenance of 76 miles of telephone line in mountainous territory subjected to heavy snowstorms and severe weather, and the making of 250 stream-flow measurements by the Reclamation Service, as no other agents are doing this work in the Yakima Valley.

This work involves the storing of 422,600 acre-feet of water, as follows:

	Acre-feet.
In Lake Keechelus	152,000
In Lake Kachess	210,000
In Lake Bumping	34,000
In Lake Clear Creek	5,800
In Lake Clealum	20,800
Total	422,600

During 1920–21 this constituted the storage for 232,000 acres, 122,000 of which were served by the Reclamation Service, 75,000 by the Indian Service, and 35,000 by Warren Act contracts, the total being served with a combined natural flow and storage right of 1,028,000 acre-feet.

This work involves considerable travel by rail and auto from Yakima, the most distant point being Lake Keechelus, 100 miles; Bumping Lake, 64 miles; Clear Creek Lake, 50 miles; Prosser, 60 miles.

During 1920 the run-off, with the exception of that of 1915, was the lowest of record. With the hold over from 1919 and the use of flashboards placed on the spillway crest of each reservoir except Keechelus, sufficient storage was secured to insure a full water supply. On September 13, owing to increased run-off from fall rains, storage release for irrigation was terminated for the year. Water to the amount of 304,675 acre-feet was drawn from the reservoirs and distributed as shown in the following tables:

Stored water released for irrigation, fiscal year 1921.

[All quantities in acre-feet.]

	Keechelus.	Kachess.	Clealum.	Bumping.	Clear Creek.	Total.
In reservoir July 4, 1920	149,520	231,667	31,998	39,178	5,944	458,307
In reservoir Sept. 13, 1920	10,530	118,619	12,167	10,242	2,074	153,632
Stored water released	138,990	113,048	19,831	28,936	3,870	304,675

Distribution of stored water released, fiscal year 1921.

[All quantities in acre-feet.]

Division or contractor.	July.	August.	September.	Total.
Tieton Division	5,464	18,022	6,142	29,628
Naches-Selah		76		76
Congdon & Rodenbeck	313	2,778	299	3,390
Dan Murphy (Taylor & Robar)	13	27	10	50
G. H. Wightman (Herbert Bostock)	13	27	10	50
H. L. Stonebraker	18	35	14	67
Thompson Fruit Co. (C. S. Mead)	8	15	9	32
W. O. Bradbury	6	11	6	23
Union Gap Irrigation District (new contract)	142	579	373	1,094
Union Gap Irrigation District (old contract)	1,318	1,680	494	3,492
Wapato Division (below 720 second-feet)	26,704	35,526	13,922	76,152
Wapato Division (above 720 second-feet)	17,415	26,065	7,248	50,728
Sunnyside Division (Grandview, Outlook, Prosser, Sunnyside, Snipes Mountain, and Sunnyside Valley Irrigation Districts)	10,768	34,508	7,388	52,664
Cascade Irrigation District	3,240	8,340	3,256	14,836
West Side Irrigating Co	672	1,672	376	2,720
Selah Moxee Irrigation District	425	2,668	274	3,367
Wasted in operation	25,658	28,913	11,735	66,306
Total	92,177	160,942	51,556	304,675

By June 30, 1921, all reservoirs were practically filled, with meteorological conditions pointing to a season of abundant water supply for the remainder of the irrigation season.

Board meetings.

Date.	Subject.	Personnel.
Apr. 1, 1921	Plans and construction schedule, Tieton Dam.	D. C. Henny, F. E. Weymouth, James Munn, J. L. Savage, F. T. Crowe, C. E. Crownover, J. L. Lytel.

SUNNYSIDE DIVISION.

DRAINAGE.

The drainage system on the Sunnyside Division is being constructed, operated, and maintained by drainage districts in accordance with the State law. Since 1912, 19 districts and 22 subdistricts have been formed, affecting 49,799 acres of land, or about 45 per cent of the irrigable area of the division. The total length of drains completed or under construction amounts to 154.42 miles, of which 76.06 miles are open ditch and 78.36 miles covered tile drains from 4 to 54 inches in diameter. The tile drains are vitrified clay, with the exception of 0.52 mile of 54-inch tile which is reinforced concrete. This drain is under construction and when completed will serve not only as a drain but also in connection with the sewage system of the town of Sunnyside. The total cost to date of drains built or under construction amounts to $1,178,101, involving 1,723,533 cubic yards of excavation. During the past two years there have been constructed 9 miles of open ditch and 31.5 miles of covered tile drains, indicating the tendency to favor the latter type of drain.

Of the total number of drains built, those from 7 districts and 15 subdistricts, affecting 22,246 acres of land, discharge into the Sulphur Creek Wasteway, which serves the twofold purpose of a relief for the

Main Canal and the main artery of the drainage system for the country between Outlook and Grandview.

OPERATION AND MAINTENANCE.

The operating season of 1920 opened March 25, when approximately 100 second-feet were turned into the Main Canal for priming. Delivery of water was made, except to lands served by laterals which were in process of reconstruction and to tracts of new land for which deliveries were not yet constructed. Little demand for water existed during the first part of April because of the cool weather and almost constant wind storms. The diversion from the river was gradually increased to approximately 1,000 second-feet April 23. This amount was sufficient to satisfy the demands and also permit the operation of the several pumping plants to capacity.

The unusually light snowfall in the mountains the preceding winter caused the flow in the Yakima River to decrease so that on May 28 it was necessary to place the flashboards on the Sunnyside Dam in order to divert the desired quantity. On May 31 a diversion of approximately 1,200 second-feet was had, which, during the first cutting of hay, was gradually reduced to approximately 1,070 second-feet on June 18, after which it was gradually increased to approximately 1,250 second-feet. This quantity was maintained until the last week in August, except for the Main Canal break on July 12 and for short periods when, because of insufficient release from storage, the desired quantity could not be obtained from the river. The maximum daily diversion was on August 24, when 1,255 second-feet were turned into the canal. The latter part of August the rate of delivery to the farms was reduced, and thereafter the diversion from the river was gradually reduced until the close of the irrigation season, October 31, when water was entirely closed off.

During the season small breaks occurred on the Snipes Mountain, Mathieson, and Benton Canals which, however, resulted in no damage, other than cost of repair of canal banks and caused no serious interruption of water service. On the Main Canal there was more serious erosion of canal banks than ever before, undoubtedly due in the main to severe and continued freezing of the preceding winter. On April 29 a fill on the upper side of the Main Canal near mile 30 broke, but there was no interruption to water service, and other than damage to cropped area and farm machinery no serious results were experienced.

On July 12, for the first time since 1912, a serious break occurred in the Main Canal. The break resulted from heavy inflow of storm water, due to a cloudburst on the Rattlesnake Ridge north of the canal. Efforts were made to relieve the situation by unchecking the several drops in the canal between mile 27 and Sulphur Creek Wasteway and reducing the flow in the Main Canal at the Zillah Wasteway. The inflow was too great, however, and a break occurred in the lower bank of the canal near mile 28.65. When the break was reported the entire flow of the Main Canal was turned into the Zillah Wasteway, at the same time reducing the diversion from the river to approximately 150 second-feet. The relief afforded by the Zillah Wasteway cut off the flow of water through the break early the next morning. The repair work was rushed night and day, using all men and teams possible. On July 16 all water in the Zillah Wasteway

was turned back into the Main Canal and the diversion from the river increased to approximately 700 second-feet. This was further increased to approximately 1,200 second-feet by July 18, after which time normal operating conditions again prevailed. For lands below the site of the break the interruption approximated five days, except in isolated places, where, because of difficulty in restoring regulation, normal conditions did not prevail for six days. Service to the several pumping plants was interrupted completely for five days, a week passing before full service was restored. Service through the Benton Canal to the Sunnyside Irrigation District was interrupted for five days.

Maintenance comprised the work necessary to keep the canals and laterals in condition for carrying the desired quantities of water, correcting and preventing erosion, removal of silt, strengthening of canal banks, clearing rights of way of weeds, and maintaining houses and grounds for the ditch riders. Laterals having a capacity of more than 10 second-feet are maintained by the Reclamation Service, as well as all measuring boxes, weirs, drops, division boxes, etc., necessary for the measurement and delivery of water. The work in the early spring consisted of cutting and burning weeds by ditch riders. As soon as the weather permitted, team crews were organized for the earthwork on canals and laterals and small maintenance crews started the repair and renewal of structures. Maintenance work, except that of the structure crews, closed down with the beginning of the operating season in April.

In the late summer and fall the two small maintenance crews were occupied entirely on the Snipes and Mabton Divisions with the replacement of wooden turnouts and measuring boxes with concrete structures. After the close of the irrigation season preparations were made to riprap with gravel approximately 2 miles of Main Canal banks where excessive erosion had taken place. The wooden turnout, chute, and sump at the head of Mabton Lateral 6.40 was torn out and its replacement with concrete started. The usual work of weed burning, willow grubbing, and silt removal was started as soon as canals and laterals were dry enough to work. Silt work was discontinued early in December because of frost.

During the year there were constructed 74 wooden and 102 concrete structures, 2½ miles of laterals, 1 mile of wood flumes, and three-quarters of a mile of pipe lines. Of the wooden structures built, 12 were main or branch canal turnouts, 38 were deliveries to new lands, 14 were additional deliveries, and the remainder of a miscellaneous type, such as drops and checks. In addition, a rock-filled crib was built between the two existing cribs on the river side of the Main Canal bank at the intake. Included in the concrete structures constructed were 55 main and branch canal turnouts, 12 deliveries to new lands, 3 additional deliveries, and 32 replacements of wooden structures, involving the placing of a total of 302 cubic yards of concrete. The construction of the wooden and concrete delivery structures concerned the delivery of water to 236 tracts of land.

For the season of 1920 the Service was prepared to furnish water to 100,733 acres, all of which was under water-right application or contract, and delivery of water was made to 93,610 acres.

Historical review, Sunnyside Division, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which the Service was prepared to supply water	89,253	93,226	97,285	98,537	100,130	100,733
Acreage irrigated	68,840	73,000	80,500	84,650	90,000	93,610
Miles of canal operated	572	585	590	590	605	605
Water diverted (acre-feet)	[1] 272,401	349,262	385,179	415,097	421,364	417,522
Water diverted to land (acre-feet)	168,852	239,898	254,280	290,402	295,215	284,800
Per acre of land irrigated (acre-feet)	2.453	3.286	3.159	3.430	3.270	3.040

[1] Shortage in supply of water available in the river, Aug. 8 to Oct. 23, 1915.

SETTLEMENT AND DEVELOPMENT.

The exceptional prosperity characteristic of the year 1919 continued through the first part of 1920. Such farm products as were available for market brought record prices. The activity of 1919 in the sale and exchange of farm lands continued unabated, general farm lands selling at from $250 to $400 per acre and fruit lands in from 20 to 40 acre tracts bringing as high as $1,000 per acre. Along with the high prices of farm products and activity in farm lands the merchants and business men in the several towns on the project did a thriving business. In the spring many farmers built new farm buildings or added extensively to those already built, farm irrigation systems were improved, laterals were reconstructed, drainage districts organized, and extensive road and highway improvements initiated.

However, when the commodities produced in 1920 reached the market in appreciable quantities, prices to be obtained were materially lower than those obtained the preceding year, and the market was sluggish. Those producers who could do so in the main held their products for a better market, but prices continued gradually to go downward. By late fall the effect of low prices for farm products was felt by the merchants, and during the balance of the year there was a noticeable lessening of the many activities under way the preceding spring. Wages, too, took a drop, and this also had its effect in further reducing the volume of business. The 1920 crop was the most expensive crop produced by the rancher in years, and the slump in prices in the fall brought an actual loss to many farmers, even though crop yields as a whole were good.

During the year the mileage of paved highways on the division was further increased by the completion of 11 miles of concrete paving on the Inland Highway between Sunnyside and Yakima, 7 miles of bitulithic paving from Sunnyside to Mabton, and 3 miles of concrete paving from Buena to Toppenish. Contract for additional mileage was let in the fall. The construction of a 50-car capacity cold-storage plant was started at Grandview, and additional warehouse capacity was completed in several of the project towns. During the year the development of the Washington State Experiment Farm was vigorously prosecuted, and at the close of the season the 200-acre farm was practically all in cultivation.

Settlement data, Sunnyside Division, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	2,682	2,740	2,780	2,810	2,905
Population	8,000	8,255	8,744	9,477	10,929
Number of irrigated farms	2,682	2,740	2,780	2,810	2,905
Operated by owners or managers	1,744	1,942	1,983	2,009	2,272
Operated by tenants	938	798	797	801	633
Population	8,000	8,255	8,744	9,477	10,929
Number of towns	11	11	11	11	11
Population	5,350	5,550	5,975	7,650	6,941
Total population of towns and on farms	13,350	13,805	14,719	17,127	17,870
Number of public schools	35	37	37	37	40
Number of churches	30	30	30	30	30
Number of banks	9	9	10	13	13
Total capital stock	$245,000	$277,500	$275,000	$400,000	$380,000
Total amount of deposits	$1,896,341	$2,349,702	$2,642,851	$4,388,610	$2,695,848
Total number of depositors	6,640	7,375	7,936	11,182	11,556

PRINCIPAL CROPS.

Following the very cold weather of December, 1919, clear and cold weather prevailed until the latter part of January, 1920, after which the weather was foggy and misty, with heavy freezing at night. Bleak and windy weather prevailed the latter part of March and the fore part of April. The last killing frost occurred on April 22, causing some damage to fruit and early vegetables. Late spring and early summer were abnormally cold. Beginning July 3 hot weather prevailed. The six weeks period ending August 17, with an average daily maximum temperature of 96° F., was the hottest of record at Sunnyside. In the fall the first killing frost occurred on October 13. The weather in the late fall and early winter was unsettled, with moderate temperatures prevailing. The precipitation of 7.64 inches for the year was above the average. No extreme temperature was experienced during the year.

Because of the bleak and backward weather, spring work on the farm was delayed materially. The winds in March and April seriously interfered with spraying and all seeding operations. The severe cold of the preceding winter occasioned serious damage to fruit trees. The late spring frosts also damaged such fruit as was in blossom, berries, and early vegetables. The hot weather of July and August, however, helped materially the generally backward crop condition and the frequent showers in spring, late summer, and early fall were also beneficial. As a result, sugar beets, potatoes, and corn, when harvest time came, returned better than average crops. Weather conditions during harvest time were favorable and sufficient labor was available at a somewhat less wage than obtained during the summer.

Alfalfa still continues as the largest crop in acreage grown. The late and unfavorable spring resulted in a short first cutting, at least two weeks later than usual. As a whole, an average yield was realized. The area of alfalfa as compared with 1919 increased 4,100 acres, or 9 per cent. The area planted to hay other than alfalfa increased 429 acres, or 34 per cent, whereas the area in pasture shows a decrease of 606 acres, or about 10 per cent, as compared with 1919. Such portion of the 1919 crop of hay as remained in the growers' hands in the spring of 1920 was sold at very high prices. In the late summer the 1920 crop sold at $20 to $22 per ton, baled

f. o. b. cars, the price declining to $15 per ton, with little demand, by the close of the year.

The acreage planted to potatoes showed an increase of 488 acres, or 15 per cent, as compared with 1919. The crop as harvested gave a yield somewhat above the average, of excellent quality. For the remainder of the 1919 crop, the price advanced from $75 per ton, f. o. b. cars in January to $150 per ton in April. At digging time the 1920 crop brought $25 to $30 per ton, the price advancing to $35 per ton in November and declining to $32 per ton at the close of the year, with a slow market. Corn showed a decrease of 2,711 acres, or 33 per cent. For this crop, too, the unfavorable spring prospect was overcome and the yield was up to the average, with the quality good.

The fruit crop was seriously affected by the severe winter of 1919–20 and further curtailed by late spring frosts and unfavorable weather. The peach crop was virtually wiped out. Cherries yielded some fruit of poor quality. Pears yielded a 40 per cent crop and apples about a half crop. The total area in fruit shows very little change as compared with 1919, such trees as were killed the preceding winter being largely replaced with an equal area of new planting.

Soft fruits of all kinds brought good prices. The market for fall and winter apples was dull. Although as a general thing fair prices were realized, since all items entering into the cost of producing the 1920 crop were at a maximum, the net return to the grower was small and in many cases an actual loss was suffered.

The acreage planted to sugar beets showed a decrease of 1,290 acres, or 51 per cent as compared with 1919. Although the spring in the main was unfavorable to other crops, conditions were good for beets and the best average yield of beets grown on the Sunnyside Division was harvested. Not enough beets were grown in the valley to justify the operation of more than one sugar factory, and the beets on the Sunnyside Division were shipped to the factory at Toppenish.

The total gross returns for 1920 were $8,330,294, as compared with $12,678,247 for 1919, the year of maximum returns. The average gross return per acre cropped was $105.53, as compared with $167.07 in 1919, $102.34 in 1918, $121.67 in 1917. The cropped area in the farms reported increased 3,050 acres, or 4 per cent, and the total acreage receiving water increased 3,610 acres, or 4 per cent.

The stock census does not show any marked change as compared with 1919. For horses and mules a slight increase is noted. Cattle show an appreciable increase in numbers and a decrease of about 25 per cent in unit values. Sheep show a marked decrease in both number and unit value, chiefly due to low prices of raw wool. Hogs, poultry, and bees show no material change. The increase in value and equipment and number and value of automobiles undoubtedly reflect the prosperity resultant from the 1919 crop and prices.

Crop report, Sunnyside Division, Yakima project, Washington, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	45,545	Ton	193,549	4.25	$16.00	$3,096,790	$68.00
Apples	10,510	Pound	58,562,163	5,572.00	.04	2,342,486	223.00
Barley	716	Bushel	20,223	28.00	1.10	22,245	31.07
Beets, sugar	1,226	Ton	18,390	15.00	13.00	239,070	195.00
Corn:							
Indian	5,110	Bushel	216,889	42.00	1.00	216,889	42.00
Fodder	422	Ton	2,485	6.00	6.00	14,910	36.00
Ensilage	403	do	4,065	10.00	8.00	32,520	80.00
Fruits, small	369	Acre			300.00	110,700	300.00
Garden	2,263	do			200.00	452,600	200.00
Hay, other than alfalfa	1,690	Ton	3,062	2.00	15.00	45,930	27.20
Hops	142	Pound	187,975	1,324.00	.40	75,190	529.60
Oats	359	Bushel	16,456	46.00	.75	12,342	34.50
Onions	51	do	7,225	141.00	.80	5,780	113.33
Pasture	5,808	Acre			20.00	116,160	20.00
Peaches	1,037	Pound	337,810	325.00	.05	16,891	16.25
Pears	1,610	do	4,642,586	2,883.00	.04	185,703	115.32
Prunes	321	do	2,269,239	7,069.00	.05	113,462	353.45
Potatoes, white	3,734	Bushel	932,002	249.00	.90	838,802	224.64
Rye	91	do	1,702	19.00	1.50	2,553	28.05
Wheat	4,153	do	222,502	53.00	1.75	389,377	99.75
Less duplicated areas	6,620						
Total cropped	78,940	Total and average				8,330,400	105.50

Irrigated, no crop:	
Young orchard	336
Young alfalfa	3,147
House and corral area	2,916
Town-site areas	1,950
Irrigated without crop	7,272
Less duplicated areas	951
Total other purposes	14,670
Total irrigated	93,610

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	93,610	2,905	84.51
Total irrigated area farms reported	93,610	2,905	84.51
Under water-right applications	32,310	1,029	29.15
Under rental contracts	61,300	1,876	55.36
Total cropped area farms reported	78,940	2,905	71.23

TIETON DIVISION.

CONSTRUCTION DURING FISCAL YEAR.

All construction work in progress during the year was done under supplemental construction in accordance with the terms of a contract with the Tieton Irrigation District dated August 7, 1918.

Canal enlargement.—The main program of enlargement on the Tieton Canal, which was begun in 1916 and completed in 1918, also provided for the reconstruction of the entrance transitions at three of the tunnels for the purpose of increasing the tunnel capacities to that of the open section. The revision of two of these structures was completed during 1919. The work of rebuilding the one remaining transition, that at North Fork Tunnel, was done with Government forces during October and November, 1920, and served to secure for the project the full benefit of the enlargement for the irrigation season of 1921.

Cottages.—Additional accommodations were provided for housing the employees at the headquarters camp by the erection during the fiscal year of two 5-room cottages, the work being done by contract, from October to December, 1920, inclusive.

SEEPAGE AND DRAINAGE.

The lands under the Tieton Division have good natural drainage, and the water users have thus been relieved of the necessity for constructing expensive drainage works. Since 1915, however, three small drains with a total length of 8 miles have been built, primarily for conveying waste water from approximately 2,000 acres of land, and are being operated and maintained by drainage districts in accordance with the state drainage law.

OPERATION AND MAINTENANCE.

No unusual incidents attended the operation of the Tieton Canal during the first half of the fiscal year from July 1, 1920, to the close of the irrigation season on September 30. The diversion requirements continued up to the limiting capacity of 310 second-feet at North Fork Tunnel until September 15, being gradually reduced to 120 second-feet by the end of the season. Following the completion on November 20 of the fall program of construction and maintenance on the Main Canal and North Fork Tunnel a flow of 75 second-feet was maintained through the canal for a period of 10 days for the purpose of filling cisterns for stock and domestic use.

Beginning April 10, 30 second-feet were drawn from the Cowiche Creek for domestic and spraying purposes in advance of the opening of the operating season of 1921 on April 16, when a like amount was diverted from the Tieton River. Water was delivered practically on demand during the period intervening before putting the regular rotation schedules into effect on May 1, at which time the quantity flowing had been gradually increased to 230 second-feet. Owing to the very favorable conditions of both weather and soil moisture, the demand for water did not develop sufficiently during the balance of the fiscal year to require the canal to be operated on a closer margin of safety than that established during the 1920 season with a maximum of 310 second-feet flowing. In addition, there was an average supplemental flow from the Cowiche Creek during the same period amounting to 14 second-feet. The total amount of water derived from these sources provided an ample supply for the irrigation of about 29,000 acres of land which were receiving water at the close of the year. This acreage represents about 91 per cent of the total irrigable area under the Tieton Division. Water service was interrupted for 24 hours on June 29 to allow for the repair of two large openings in the semicircular concrete section caused by a 2-ton rock rolling from the hillside and breaking through the 4-inch reinforced side walls. Other interruptions in water delivery during the last half of the year were of a minor nature, being confined to the sublateral system on Part One, where the usual difficulties were encountered with small nonreinforced concrete pipe lines.

In addition to the usual minor repairs to the Main Canal, removal of silt from main laterals, and cleaning and painting of steel flumes, the program of fall maintenance work contemplated placing a thin plaster lining of concrete in the bottoms of both Tieton and North Fork Tunnels, which are showing considerable wear. At the time of making the customary fall run of cistern water on November 20 this program was only about 80 per cent complete. The protection from the weather afforded within the tunnels permitted the work on con-

crete lining to continue after November 30, and by January 22 a total of approximately 100 cubic yards of concrete had been placed, completing the resurfacing of the floors in both tunnels. The remainder of the fall program was necessarily delayed until spring, when it was finished up in connection with the cleaning of the entire sublateral system. Other maintenance work, performed mostly during the nonirrigation season, consisted of the maintenance of houses and grounds, the upkeep of the telephone system, and the repair and replacement of structures, including small concrete pipe lines and wooden flumes on the sublateral system. The latter work involved the installation of 8,650 linear feet of wood, concrete, and tile pipe from 6 to 24 inches in diameter, and the placing of 60 cubic yards of concrete, in addition to the renewal, in kind, of many wooden delivery structures.

Historical review, Tieton Division, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	34,000	30,000	31,000	31,000	32,000	32,000
Acreage irrigated	22,000	23,000	25,400	26,400	27,000	28,000
Miles of canal operated	335	335	335	335	335	335
Water diverted (acre-feet)	62,000	74,936	80,377	90,280	98,223	96,503
Water served to land (acre-feet)	40,376	49,412	57,318	64,068	70,776	69,471
Per acre of land irrigated (acre-feet)	1.83	2.15	2.26	2.43	2.62	2.47

SETTLEMENT AND DEVELOPMENT.

There has been a gratifying increase in the proportionate number of owners operating their own farms, from 55 per cent of the total in 1916 to about 80 per cent in 1921. Accompanying this increase a noticeable improvement in farming methods and in crop results is being observed. The tendency to subdivision of tracts into smaller holdings continues; in 1920 the average farm contained 22.8 acres of irrigable land, of which 20.9 acres were irrigated and 20.3 acres in crop. In spite of the general business depression prevailing since last fall the sale and exchange of farm lands has not been altogether at a standstill with prices almost as high as last year, the average maximum ranging from $750 to $1,200 per acre for producing orchards with crops.

The actual net returns to the farmers during 1920 were less than for either 1918 or 1919 on account of the high wages paid for labor, followed by a general drop in prices on all farm produce at the time for marketing, causing many to suffer considerable loss. In addition, the returns on apples, the main crop on this division, were materially reduced by the increased freight rates. At the opening of the 1921 irrigation season the number of delinquencies for operation and maintenance and for construction charges was higher than for several years, and represented about 7 per cent of the total area under water-right application. Some difficulty was encountered by the farmers in meeting these payments, but, following the approval of House Joint Resolution No. 52, on May 27, those remaining, who saw fit to apply for relief offered, represented only 1 per cent of the total water-right area under the project.

Development has not been so active as in the previous year. Except for minor improvements, which the farmer can erect himself, no

building has been undertaken. A small amount of road work, consisting mostly of grading, has been in progress. At the close of the year plans were being worked out on Parts One and Two for organizing and constructing a line to secure electric power from the Pacific Power & Light Co. to serve the entire north half of the project.

Settlement data, Tieton Division, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	1,300	1,400	1,400	1,480	1,480
Population	2,250	2,150	2,150	2,850	3,314
Number of irrigated farms	1,100	1,190	1,280	1,253	1,340
Operated by owners or managers	600	726	820	903	1,048
Operated by tenants	500	464	460	350	292
Population	2,250	2,150	2,150	2,850	3,314
Number of towns	7	7	8	8	8
Population	20,000	20,500	21,850	23,000	23,000
Total population of towns and on farms	22,250	22,650	24,000	25,850	26,314
Number of public schools	10	10	10	10	10
Nnmber of churches	3	3	3	3	3

PRINCIPAL CROPS AND LIVE STOCK.

Weather conditions in general during the year 1920 were normal and especially favorable for conserving the runoff from the exceptionally light snowfall in the mountains during the previous winter. Consequently, there was an ample supply of irrigation water throughout the season in spite of the earlier indications to the contrary. Owing to the effects from severe cold weather in December, 1919, the peach crop was almost a complete failure, and the apples were slightly undersize. Practically the entire crop was harvested, however, without injury from frost and the largest yield of apples in the history of the Tieton Division was the result.

The 1920 crop census showed a continued increase in the acreage of orchard and hay land with a reduction in the area planted to grain, potatoes, beets, and beans. The rapid development of 7,000 acres of apple orchard has advanced this crop to first place in importance, the returns representing more than 50 per cent of the total on the entire net cropped acreage of 27,250 acres. Alfalfa hay continues to be the largest crop in point of acreage, covering, together with new seeding, 59 per cent of the net cropped area and returning approximately 21 per cent of the total crop valuation with an average yield of 3.2 tons per acre.

The total returns of $3,471,400 for the season of 1920 are about 2 per cent greater than the net construction cost to the end of the fiscal year, although amounting to 15 per cent less than the record-breaking returns for the previous year. The return per acre cropped was $127.40, as compared with $154.10 in 1919 and $97.36 in 1918. The maximum return per acre of $478 was realized on 313 acres of hops, with 220 acres of small fruits coming second at $264.50 per acre. The apple crop brought an average return of $257.70 per acre. The average farm return amounted to $2,591.

Analysis of the stock census indicates little change in that for the previous year, although sufficient increase is made to maintain the same average number of all animals per farm. Sheep and hogs show a marked decline in number, as well as in total valuation. The gradual reduction continuing from 1916 to 1919 in the number of

cattle is checked by an increase of 8 per cent over that for the previous year, although a slight decrease in the number of silos is evidence of no corresponding growth in the dairy industry. The total stock valuation at the close of the year 1920 amounted to $476,646, or an average of $356 per farm.

With the combination of favorable weather conditions, a plentiful water supply, and more than the usual amount of moisture in the soil at the opening of the irrigation season of 1921, all crops were in excellent condition and prospects at the close of the fiscal year pointed to the production of the largest tonnage in the history of the project. Although no extraordinary prices are being predicted, the cost of production undoubtedly will be sufficiently lower than for several years to allow a good margin of return to the farmers.

Crop report, Tieton Division, Yakima project, Washington, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	15,118	Ton	47,917	3.20	$15.00	$718,755	$47.55
Apples	7,134	Pound	52,526,850	7,360.00	.035	1,838,450	257.70
Barley	1,012	Bushel	32,281	31.90	1.00	32,281	31.90
Beans	38	...do	548	12.04	3.00	1,644	43.25
Beets, sugar	18	Ton	289	15.90	12.00	3,468	192.65
Corn	885	Bushel	36,579	41.30	1.20	43,900	49.60
Ensilage	171	Ton	1,518	8.90	8.00	12,144	71.00
Fodder	104	...do	612	5.90	5.00	3,060	29.40
Fruits, small	220	Pound	465,595	2,115.00	.125	58,199	264.50
Garden	310	Acres			150.00	46,500	150.00
Hay (except above)	415	Ton	625	1.50	15.00	9,375	22.60
Hops	313	Pound	374,000	1,195.00	.40	149,600	478.00
Oats	389	Bushel	13,231	34.00	.70	9,261	23.80
Onions	61	...do	16,912	278.00	.75	12,684	207.95
Pasture	1,210	Acre			20.00	24,200	20.00
Peaches	590	Pound	1,017,040	1,720.00	.06	61,022	103.40
Pears	1,737	...do	4,840,500	2,785.00	.04	193,620	111.45
Potatoes	812	Bushel	127,875	157.00	.90	115,087	141.75
Wheat	2,873	...do	78,943	27.50	1.75	138,150	48.10
Less duplicated areas	6,160						
Total cropped	27,250	Total and average				3,471,400	127.40

Irrigated, no crop:	
Young orchard	950
Young alfalfa	880
Irrigated, no crop	90
Building sites, etc	410
Less duplicated areas	1,580
Total other purposes	750
Total irrigated	28,000

Areas.	Acres.	Farms.	Per cent of project
Total irrigable area farms reported	30,600	1,340	95.60
Total irrigated area farms reported	28,000	1,340	87.50
Under water-right applications	27,962	1,337	87.40
Under rental contracts	38	3	.10
Total cropped area farms reported	27,250	1,340	85.20

WARREN ACT CONTRACTS.

A table of contracts under the Warren Act is printed in the General Discussion, page 23.

PROPOSED NEW DIVISIONS.

The proposed program of storage development for the Yakima project will provide sufficient water for the irrigation of approximately 200,000 acres of new development made up as follows:

	Acres.
Kittitas Division	70,000
Kennewick Division	35,000
Moxee Division	40,000
Roza Division	60,000

These divisions are briefly described on page 380 of the 19th annual report.

Kittitas Division (Kittitas Reclamation District).—No work was performed by the Service on this division during the fiscal year, but a contract providing for sale of water supply to the district was entered into. At the end of the year the district had under way the revision of surveys, plans, and estimates, the work being carried on under the supervision of J. R. Sherman, as engineer in charge.

Kennewick Division (Kennewick Irrigation District).—The Washington State Reclamation Service, under contract with the district, proceeded with the taking of topography and subdivision of sections from the point where our work ended last year. All the notes and maps made by the State have been truned over to the Yakima project files. The district began negotiations to secure right of way for the Prosser Power Canal, and power rights at the Prosser Dam. Contract for furnishing a water supply to the district was entered into by the United States under date of June 11, 1921.

Moxee Division (Yakima Irrigation District).—Surveys were continued under contract between the United States and the district, the field work being completed December 21, 1920. Final report and cost estimates were forwarded to the chief engineer for approval on June 29, 1921. Form of contract for sale of water supply to the district was approved by the department, and submitted to the district for execution.

Roza Division (Yakima-Benton Irrigation District).—Surveys were continued under contract between the United States and the district. Both field and office work were in progress on these surveys at the end of the fiscal year. Form of contract for sale of water supply to the district was approved by the department, and submitted to the district for execution.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, JULY 29, 1920.

1. In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), public notice for the Tieton unit of the Yakima project, Washington, is hereby issued, as follows:

2. **Lands for which water will be furnished.**—Upon proper application being made therefor, water will be furnished under said project in the irrigation season of 1920 and thereafter for lands shown on diagrams amendatory of the farm-unit plats of the following townships, to wit: Townships 12 and 14 N., range 16 E., W. M.; Townships 12, 13, and 14 N., range 17 E., W. M.; Township 13 N., range

18 E., W. M.; which amendatory diagrams were approved on the date of this notice. Copies of said amendatory diagrams and of said plats are on file in the office of the project manager, United States Reclamation Service, and in the local land office, both at Yakima, Wash.

3. **Application for water right.**—All water-right applications must be made to the project manager, United States Reclamation Service, Yakima, Wash., upon forms provided for that purpose, and may be made on and after the date hereof. The maximum limit of area for which application may be made shall be 160 acres of irrigable land for each landowner.

4. **Classes of water-right charges.**—The water-right charges are of two kinds, to wit: (*a*) A charge against each acre of irrigable land to cover the cost of construction of the irrigation system, termed the construction charge; and (*b*) an annual charge against each acre of irrigable land to cover the cost of operation and maintenance of the irrigation system, termed the operation and maintenance charge.

5. **Construction charge.**—The construction charge for the lands shown on said amendatory diagram shall be at the rate of $110 per acre of irrigable land, plus the supplemental construction charges authorized by the Yakima-Tieton Irrigation District election of July 6, 1918, and payable by the district lands pursuant to contract between the United States and the district, dated July 18, 1918.

(*a*) For lands that were, on or before August 13, 1914, subjected by contract or otherwise to the provisions of the reclamation law, said construction charge shall be payable in 10 annual installments, the first of which shall become due and payable on December 1, 1920, and subsequent installments on December 1 of each year thereafter: *Provided*, That if an acceptance of the provisions of said extension act has been heretofore filed, or a water-right application subject to the provisions of said act or an acceptance of the provisions thereof, be filed within six months from the date of this notice, said construction charge shall be payable in 20 installments, the first of which shall become due on December 1, 1920, and subsequent installments on December 1 of each year thereafter, in which event the first 4 installments shall each be 2 per cent, the next 2 installments each 4 per cent, and the next 14 each 6 per cent of the total construction charge.

(*b*) Lands shown on said amendatory diagrams and owned by the State of Washington are subject to the provisions of section 2 of said extension act, and the construction charge against same shall be payable in the manner outlined above in paragraph 4 (*a*): *Provided*, That the first installment of the construction charge shall in each case become due on December 1 following the date of sale of the land by the State to an individual.

(*c*) For the remaining lands shown on said amendatory diagrams, an initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent install-

ments shall become due and payable on December 1 of each calendar year thereafter. These lands are subject to the increases provided by section 9 of said extension act when the making of water-right application is delayed.

(*d*) The construction charge against lands referred to in paragraphs 4(*a*) and 4(*b*) shall become due and payable without reference to whether water-right application is filed; and if payment is not made on the due date, the penalties provided under section 3 of said extension act shall become effective.

6. **Operation and maintenance charge.**—The annual charges for operation and maintenance for lands covered by this notice shall be at the same rate as for other lands under the Tieton unit of the Yakima project: *Provided*, That the first charge for lands in private ownership shall be for the irrigation season of 1920 and shall become due on March 1, 1921, and for lands owned by the State of Washington the first charge shall in each case become due on March 1 of the year following the date of sale of the land to an individual. Operation and maintenance charges shall become due and payable without reference to the filing of a water-right application; and if payment is not made on the due date, the penalties under section 6 of the said extension act shall become effective: *Provided*, That charges shall not be cumulative on lands subject to section 1 of said extension act prior to the filing of a water-right application.

S. G. Hopkins,
Acting Secretary of the Interior.

PUBLIC NOTICE, FEBRUARY 19, 1921.

Annual operation and maintenance charges.—In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1921 and thereafter until further notice against all lands of the Tieton Division, Yakima project, Washington, under public notice, will be as follows: A charge of $2 per irrigable acre will be made whether water is used or not. This amount when paid will be credited as payment for water delivered at the following rates: $1.75 per acre-foot for all water delivered between June 1 and August 31, inclusive, and $1 per acre-foot for all water delivered at other times during the irrigation season. All operation and maintenance charges are due and payable annually on March 1 following the irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15 in any year, or where water-right application is made after August 1 in any year for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

John Barton Payne,
Secretary of the Interior

FINANCIAL STATEMENT.

Condensed financial statement, Yakima project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$11,655.83
Inventory of materials and supplies on hand			187,537.61
Plant and equipment in use			462,758.68
Current accounts receivable			208,444.78
Construction charges not due			6,603,600.57
Unearned value of contracts			15,054.91
Construction cost of works		$10,558,435.36	
Operation and maintenance added to construction		77,538.99	
Operation and maintenance during construction		10,208.54	
Unadjusted clearing accounts		18,379.75	
Gross construction cost		10,664,562.64	
Less revenues and adjustments during construction period		320,966.88	
Net construction cost			10,343,595.76
Operation and maintenance cost under public notice	$1,904,197.47		
Less operation and maintenance added to construction	77,538.99		
Gross operation and maintenance cost		1,826,658.48	
Less revenues and adjustments		1,721,212.14	
Deficit to Dec. 31, 1920	64,225.67		
Net cost Jan. 1 to June 30, 1921	41,220.67		
			105,446.34
Investment items in transit			1,752.81
Total debits			17,939,847.29

CREDITS.

Current accounts payable			54,002.93
Contingent and deferred liabilities			26,342.55
Resources for repaying cost of project			9,219,406.54
Revenues held in reserve			19,034.24
Investment:			
Disbursements and transfers from other projects	$13,843,348.37		
Items in transit	1,805.34		
Total		$13,845,153.71	
Less collections and transfers to other projects	5,224,040.15		
Items in transit	52.53		
Total		5,224,092.68	
Net investment			8,621,061.03
Total credits			17,939,847.29

Construction costs and revenues, Yakima project, Sunnyside Division.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys	$27.09	$47,255.72
Pumping for irrigation:		
Snipes Mountain Irrigation District		62,025.23
Outlook Irrigation District		99,177.60
Grandview Irrigation District		108,438.70
Prosser Irrigation District		126,759.59
Total pumping for irrigation		396,401.12
Canal system: Main canal		1,681,694.68
Lateral system:		
General gravity system		727,141.82
Sunnyside Irrigation District		108,705.02
Snipes Mountain Irrigation District		35,499.64
Outlook Irrigation District		108,034.95
Grandview Irrigation District		83,019.04
Prosser Irrigation District		46,873.73
Supplemental construction		2,606.40
Total lateral system		1,111,880.60
Drainage system, investigations		11,418.80
Farm units		22,462.15
Permanent improvements		36,128.55
Telephone system		22,412.57
Operation and maintenance charges transferred to construction	17,154.31	35,874.55
Gross construction cost	17,181.40	3,365,528.74

Construction costs and revenues, Yakima project, Sunnyside Division—Continued.

Features.	Fiscal year 1921.	To June 30, 1921.
Less revenues earned during construction period:		
Rental of buildings	$11,796.22	$15,720.31
Contractors' freight refunds	2.49	11,055.76
Hospital operations	588.24	1,823.70
Total revenues	12,386.95	28,599.77
Net construction cost, June 30, 1921	4,794.45	3,336,928.97

Construction cost and revenue, Yakima project, Tieton Division.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and survey		$69,694.56
Storage works:		
Bumping Lake Dam		550,837.42
Clear Creek Dam		84,542.78
		635,380.20
Canal system:		
Headworks		14,937.15
Tunnels		397,100.73
Main Canal		759,396.05
Wasteways		57,181.22
Culverts and drains		22,453.97
Supplemental construction	[1] $260.80	96,035.75
	[1] 260.80	1,347,104.87
Lateral system:		
Headworks and diversion dams		26,958.20
Laterals and sublaterals		855,886.93
Flumes		108,390.45
Bridges		5,562.36
Drops, chutes, checks, and turnouts		77,442.46
Siphons		14,175.95
Wasteways		11,067.21
Culverts and drains		54,226.07
Supplemental construction	3,494.87	3,494.87
	3,494.87	1,157,204.50
Permanent improvements and lands:		
Buildings and grounds		41,943.95
Roads		59,573.55
Real estate		2,768.60
Supplemental construction	10,873.37	10,873.37
	10,873.37	115,159.47
Telephone system		25,148.78
Operation and maintenance during construction		10,208.54
Operation and maintenance transferred	[1] 50.00	41,664.44
Gross construction cost to June 30, 1921	14,057.44	3,401,565.36
Less revenues earned during construction period:		
Rentals of buildings	11,486.26	16,313.61
Rentals of irrigating water		3,526.50
Contractors' freight refunds		5,092.12
Other revenues, unclassified	[1] 1,522.11	
Hospital operations, profit	286.15	3,398.52
Total revenues	10,250.30	28,330.75
Net construction cost to June 30, 1921	3,807.14	3,373,234.61

[1] Contra.

Construction cost and revenue, Yakima project, Storage Division.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examination and surveys: General storage:		
Reservoir reconnaisance		$2,927.92
Hydrographis surveys		5,460.48
Hydrographic investigations		29,303.43
High Line investigations		2,700.12
American River investigations		1,998.38
Total examination and surveys		42,390.33
Storage works:		
Tieton Dam—		
Preliminary and general work		19,923.46
Dam	$84,071.55	149,822.90
Tunnel	90,965.87	316.342.83
Clearing reservoir	22,908.28	131,292.33
	197,945.70	617,381.52
Kachess Dam—		
Preliminary and general work		13,216.82
Dam		416,553.45
Spillway		35,656.58
Clearing reservoir		187,200.48
		652,627.33
Keechelus Dam—		
Preliminary and general work		21,477.58
Dam		1,313,764.45
Spillway		125,556.79
Tunnel		115,865.15
Clearing reservoir	60,214 19	363,873.30
	60,214.19	1,940,537.27
Clealum Dam—		
Preliminary and general work		33,832.24
Dam		116,852.59
Clearing reservoir		10,569.01
		161,253.84
Clear Creek Dam—		
Dam		50,916.75
Spillway		5,037.58
		55,954.33
Total storage works	258,159.89	3,427,754.29
Permanent improvement to lands:		
Tieton Dam—		
Roads	24,627.35	178,544.88
Bridges	2,250.00	17,237.82
	26,877.35	195,782.70
Kachess Dam—		
Buildings		2,637.56
Roads		4,971.82
		7,609.38
Keechelus Dam—		
Buildings		2,768.04
Roads		15,891.90
Bridges		3,714.60
		22,374.54
Clealum Dam—Buildings		500.17
Total permanent improvements	26,877.35	226,266.79
Telephone system:		
Tieton Dam		1,125.72
Kachess Dam		1,008.07
Keechelus Dam		3,255.61
Clealum Dam		142.62
Total telephone system		5,532.02
Total cost construction features	285,037.24	3,701,943.43

Construction cost and revenue, Yakima project, Storage Division—Continued.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Unadjusted clearing accounts	[1] $108,940.21	$17,549.56
Undistributed storage, operation and maintenance	[1] 98.32	11,268.68
Gross construction cost	175,998.71	3,730,761.67
Less revenues earned during construction period:		
Rental of buildings	277.36	30,364.76
Rental of grazing and farm lands	51.00	51.00
Rental of camp sites	390.90	1,359.42
Net power earnings (prior to public notice)	.....	1,766.13
Rental of irrigation water	24,239.50	70,640.00
Rental of telephones and tolls	.....	45.60
Contractors' freight refunds	2.95	195.84
Other revenues, not classified	6,731.35	165,089.71
Profit on hospital operations	389.45	1,842.23
Farming operations	[1] 1,921.99	[1] 419.94
Field cost adjustments	[1] 6,236.52	[1] 6,236.52
Total revenues	23,924.00	264,698.23
Net construction cost to June 30, 1921	152,074.71	3,466,063.44

[1] Contra.

Construction cost and revenue, Yakima project, High Line Division, June 30, 1921.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys	$32,177.43	$165,876.68
Unadjusted clearing accounts	830.19	830.19
Gross construction costs to June 30, 1921	33,007.62	166,706.87
Loss—Hospital operations:		
Yakima High Line Division	[1] 103.38	[1] 770.49
Yakima office	114.26	108.62
Total	10.88	[1] 661.87
Net construction costs to June 30, 1921	32,996.74	167,368.74

[1] Contra.

Operating cost and revenue, Yakima project, Sunnyside Division.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COST.						
Storage works	$8,309.50	$3,745.91	$12,055.41	$24,920.65	$11,308.09	$36,228.74
Canal system	13,798.48	63,148.14	76,946.62	191,691.50	476,155.70	667,847.20
Lateral system	16,882.19	45,384.63	62,266,82	160,006.06	352,364.49	512,370.55
Total costs	38,990.17	112,278.68	151,268.85	376,618.21	839,828.28	1,216,446.49
Unpaid operation and maintenance charges added to construction	.....	.....	[1] 15,396.61	.....	.....	[1] 34,116.85
Balance	.....	.....	135,872.24	.....	.....	1,182,329.64
REVENUE.						
Operation and maintenance repayments under contract with water users:						
Charges due	.....	.....	142,032.56	.....	.....	1,077,967.93
Advance payments	.....	.....	[1] 50.13	.....	.....	177.95
Forfeitures	.....	.....	.....	.....	.....	145.92
Interest and penalties	.....	.....	455.89	.....	.....	13,853.72
Water rentals	.....	.....	3,968.22	.....	.....	51,083.62
Rentals lands, and buildings	.....	.....	[1] 8,248.17	.....	.....	.....
Rentals of telephones and tolls	.....	.....	.....	.....	.....	1.75
Other revenues, unclassified	.....	.....	30.40	.....	.....	1,340.97
Discounts	.....	.....	[1] 2,878.94	.....	.....	[1] 7,551.13
Total revenues	.....	.....	135,309.83	.....	.....	1,137,020.73
Difference, deficit	.....	.....	562.41	.....	.....	45,308.91

[1] Contra.

Operating cost and revenue, Yakima project, Tieton Division.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COST.						
Storage works	$3,580.00	$1,611.50	$5,191.50	$17,439.36	$7,226.95	$24,666.31
Canal system	3,136.96	10,697.32	13,834.28	24,369.18	45,822.44	70,191.62
Lateral system	13,520.28	56,498 95	70,019.23	107,165.26	282,513.10	389,678.36
Permanent improvements		5,154.45	5,154.45		24,595.28	24,595.28
Miscellaneous expense					3,569.67	3,569.67
Undistributed clearing account			404.38			404.38
Total cost	20,237.24	73,962.22	94,603.84	148,973.80	363,727.44	513,105.62
Less unpaid operation and maintenance charges added to construction			16.50			41,654.44
Balance			94,587.34			471,451.18
REVENUE.						
Operation and maintenance repayments under contract with water users:						
Charges due			86,866.96			458,049.19
Advance payments						4.19
Forfeitures						22.50
Interest and penalties			1,769.50			6,881.66
Water rentals			482.00			3,390.00
Rentals of lands and buildings			[1] 8,913.26			310.00
Other revenues unclassified						13.96
Discounts			[1] 2,091.33			[1] 7,619.52
Total revenues			78,113.87			461,051.98
Difference, deficit			16,473.47			10,399.20

[1] Contra.

Operating cost and revenue, Yakima project, Storage Division.

Item.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Cost	$8,465.20	$3,810.00	$12,275.20	$29,671.43	$22,242.57	$51,914.00
REVENUE.						
Operation and maintenance repayments under contract with water users:						
Charges due			345.12			43,384.64
Forfeitures						8.46
Interest and penalties						3.34
Rentals of lands and buildings			[1] 340.00			
Total			5.12			43,396.44
Difference, deficit			12,270.08			8,517.56

[1] Contra.

Cost, by calendar years, Yakima project, Sunnyside Division.

Year ending Dec. 31—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1907	$550,161.00		$550,161.00	$45,438.41		$45,438.41	$595,599.41
1908	244,100.05		244,100.05	47,592.06		47,592.06	291,692.11
1909	174,339.32		174,339.32	51,946.01		51,946.01	226,285.33
1910	642,867.08		642,867.08	82,223.95		82,223.95	725,091.03
1911	604,636.56		604,636.56	83,252.51		83,252.51	687,889.07
1912	153,779.92		153,779.92	86,480.45		86,480.45	240,260.37
1913	14,806.80		14,806.80	83,958.92		83,958.92	98,765.72
1914	87,471.24		87,471.24	78,709.20		78,709.20	166,180.44
1915	389,067.68	$9,211.16	398,278.84	76,075.81	$9,211.16	66,864.65	465,143.49
1916	133,243.46	2,636.69	135,880.15	74,647.80	2,636.69	72,011.11	207,891.26
1917	150,997.05	5,096.86	156,093.91	102,105.36	5,096.86	97,008.50	253,102.41
1918	139,234.02	1,819.23	141,053.25	128,860.55	1,819.23	127,041.32	268,094.57
1919	44,754.52	[1] 43.70	44,710.82	123,886.61	[1] 43.70	123,930.31	168,641.13
1920	168.40	15,396.61	15,565.01	151,268.85	15,396.61	135,872.24	151,437.25
To June 30, 1921	27.09	1,757.70	1,784.79	74,501.14	1,757.70	72,743.44	74,528.23
Total	3,329,654.19	35,874.55	3,365,528.74	1,290,947.63	35,874.55	1,255,073.08	4,620,601.82

[1] Contra.

Cost, by calendar years, Yakima project, Tieton Division.

Year ending Dec. 31—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1907	$174,725.75			$174,725.75				$174,725.75
1908	478,025.00			478,025.00				478,025.00
1909	631,275.00			631,275.00				631,275.00
1910	587,278.00		$10,208.54	597,486.54				597,486.54
1911	928,785.63			928,785.63	$22,003.53		$22,003.53	950,789.16
1912	220,689.90			220,689.90	39,355.11		39,355.11	260,045.01
1913	22,395.00			22,395.00	43,857.57		43,857.57	66,252.57
1914	77,103.34			77,103.34	41,174.81		41,174.81	118,278.15
1915	10,909.75	$27,866.34		38,776.09	35,026.00	$27,866.34	7,159.66	45,935.75
1916	22,726.86	2,279.08		25,005.94	38,614.51	2,279.08	36,335.43	61,341.37
1917	13,080.85	7,511.67		20,592.52	49,164.33	7,511.67	41,652.66	62,215.18
1918	72,712.27	255.00		72,967.27	69,409.13	255.00	69,154.13	142,121.40
1919	94,843.20	3,725.85		98,569.05	79,896.79	3,725.85	76,170.94	174,739.99
1920	12,674.87	16.50		12,691.37	94,199.46	16.50	94,182.96	106,874.33
To June 30, 1921	2,466.96	10.00		2,476.96	48,634.60	10.00	48,624.60	51,101.56
Total	3,349,692.38	41,664.44	10,208.54	3,401,565.36	561,335.84	41,664.44	519,671.40	3,921,236.76

Cost, by calendar years, Yakima project, Storage Division.

Year ending Dec. 31—	Construction.	Operation and maintenance.	Total cost.
1910	$215,294.03		$215,294.02
1911	265,073.62		265,073.60
1912	243,726.04		243,726.02
1913	428,742.35		428,742.33
1914	439,333.12	$517.15	439,850.24
1915	479,918.70	5,891.02	485,809.75
1916	559,439.14	3,997.36	563,436.57
1917	412,639.78	9,760.43	422,400.21
1918	358,851.49	9,599.64	368,451.13
1919	[1] 4,371.97	9,873.20	5,501.23
1920	78,501.16	12,275.20	90,776.36
To June 30, 1921	253,614.21		253,614.21
Total	3,730,761.67	14,519.00	3,782,675.67

[1] Contra.

Cost, by calendar years, Yakima project, High Line Division.

Year ending Dec. 31—	Construction.	Total cost.
1918	$45,901.82	$45,901.82
1919	81,380.40	81,380.40
1920	20,099.05	20,099.05
To June 30, 1921	19,325.60	19,325.60
Total	166,706.87	166,706.87

Cost by fiscal years, Yakima project, Sunnyside Division.

Year ending June 30—	Construction.			Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1907	$284,355.48	.....	$284,355.48	$30,971.13	.....	$30,971.13	$315,326.61
1908	237,327.31	.....	237,327.31	49,221.16	.....	49,221.16	286,548.47
1909	289,040.64	.....	289,040.64	49,453.67	.....	49,453.67	338,494.31
1910	550,533.44	.....	550,533.44	64,811.50	.....	64,811.50	615,344.94
1911	597,597.57	.....	597,597.57	86,437.82	.....	86,437.82	684,035.39
1912	385,810.24	.....	385,810.24	95,541.15	.....	95,541.15	481,351.39
1913	38,163.16	.....	38,163.16	66,256.68	.....	66,256.68	104,419.84
1914	13,720.41	.....	13,720.41	89,111.28	.....	89,111.28	102,831.69
1915	359,682.05	$8,148.46	367,830.51	74,184.51	$8,148.46	66,036.05	433,866.56
1916	157,422.11	2,565.79	159,987.90	70,919.39	2,565.79	68,353.60	228,341.50
1917	213,966.77	3,173.52	217,140.29	87,153.75	3,173.52	83,980.23	301,120.52
1918	124,549.07	4,262.59	128,811.66	111,333.06	4,262.59	107,070.47	235,882.13
1919	76,156.72	569.88	76,726.60	138,182.58	569.88	137,612.70	214,339.30
1920	1,302.13	.....	1,302.13	120,026.32	.....	120,026.32	121,328.45
1921	27.09	17,154.31	17,181.40	157,343.63	17,154.31	140,189.32	157,370.72
Total	3,329,654.19	35,874.55	3,365,528.74	1,290,947.63	35,874.55	1,255,073.08	4,620,601.82

Cost by fiscal years, Yakima project, Tieton Division.

Year ending June 30—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1907	$177,018.59	.....	.....	$177,018.59	.....	.....	.....	$177,018.59
1908	478,256.92	.....	.....	478,256.92	.....	.....	.....	478,256.92
1909	631,056.66	.....	.....	631,056.66	.....	.....	.....	631,056.66
1910	584,647.91	.....	$10,208.54	594,856.45	.....	.....	.....	594,856.45
1911	906,776.57	.....	.....	906,776.57	$16,093.92	.....	$16,093.92	922,870.49
1912	218,372.47	.....	.....	218,372.47	26,447.16	.....	26,447.16	244,819.63
1913	22,032.06	.....	.....	22,032.06	41,215.75	.....	41,215.75	63,247.81
1914	36,817.09	.....	.....	36,817.09	40,966.73	.....	40,966.73	77,783.82
1915	72,026.67	$16,932.44	.....	88,959.11	36,576.06	$16,932.44	19,643.62	108,602.73
1916	3,467.02	12,018.53	.....	15,485.55	40,202.43	12,018.53	28,183.90	43,669.45
1917	24,805.12	5,837.47	.....	30,642.59	44,122.03	5,837.47	38,284.56	68,927.15
1918	12,011.85	3,123.65	.....	15,135.50	59,374.16	3,123.65	56,250.51	71,386.01
1919	162,173.19	2,701.65	.....	164,874.84	72,148.37	2,701.65	69,446.72	234,321.56
1920	6,122.82	1,100.70	.....	7,223.52	87,020.76	1,100.70	85,920.06	93,143.58
1921	14,107.44	[1] 50.00	.....	14,057.44	97,168.47	[1] 50.00	97,218.47	111,275.91
Total	3,349,692.38	41,664.44	10,208.54	3,401,565.36	561,335.84	41,664.44	519,671.40	3,921,236.76

[1] Contra.

Cost by fiscal years, Yakima project, Storage Division.

Year ending June 30—	Construction.	Operation and maintenance.	Total cost.
1910	$443,807.26	.....	$443,807.26
1911	337,361.17	.....	337,361.17
1912	[1] 214,039.11	.....	[1] 214,039.11
1913	284,545.65	.....	284,545.65
1914	446,695.02	.....	446,695.02
1915	500,188.76	$517.15	500,705.91
1916	374,175.46	5,891.02	380,066.48
1917	542,432.48	3,997.36	546,429.84
1918	540,389.08	9,760.43	550,149.51
1919	144,510.36	9,599.64	154,110.00
1920	154,696.83	9,873.20	164,570.03
1921	175,998.71	12,275.20	188,273.91
Total	3,730,761.67	51,914.00	3,782,675.67

[1] Credit due to transfer of cost of Bumping Lake Reservoir to Tieton Division, $506,267.94.

Cost by fiscal years, Yakima project, High Line Division.

Year ending June 30—	Construction.	Total cost.
1919	$103,899.49	$103,899.49
1920	29,799.76	29,799.76
1921	33,007.62	33,007.62
Total	166,706.87	166,706.87

General expense, Yakima project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$3,191.66	$6,905.93	$10,097.59	$129,200.57	$64,424.16	$193,624.73
Project office	5,704.39	1,117.69	6,822.08	626,687.14	200,666.55	827,353.69
Denver office	1,416.52	2,953.29	4,369.81	26,335.56	24,161.81	50,497.37
District counsel's office	769.15	1,738.90	2,508.05	9,551.24	11,010.57	20,561.81
Other offices and miscellaneous	6,082.94	19,405.95	25,488.89	415,877.08	93,659.11	509,536.19
Total	17,164.66	32,121.76	49,286.42	1,207,651.59	393,922.20	1,601,573.79
Percentage of general expense to gross cost	7.7	12.1	8.5	11.3	20.7	12.8

WYOMING, RIVERTON PROJECT.

H. D. Comstock, project manager, Riverton, Wyo.

LOCATION.

County: Fremont.
Townships: 1 to 4 N., Rs. 2 W. to 6 E., Wind River meridian.
Railroad: Chicago & North Western.
Project cities and towns and estimated population June 30, 1921: Riverton, 2,000; and Shoshoni, 500.

WATER SUPPLY.

Source of water supply: Wind River.
Area of drainage basin: About 1,800 square miles.
Annual run-off in acre-feet: Wind River at Riverton, Wyo. (2,320 square miles), 1906, 1908, and 1911 to 1920, inclusive, maximum 1,127,000, minimum 442,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1921: None.
Area under water-right applications and rental contracts, season of 1921: None.
Length of irrigation season: May 1 to September 30, 153 days.
Average elevation of irrigable area: 5,200 feet above sea level.
Rainfall on irrigable area: About 8 inches (no direct record).
Average maximum temperature, period 1891–1920, at Lander, Wyo., 30 miles south of project, is 94° F.; average minimum temperature, −27° F.
Character of soil of irrigable area: Sandy loam to heavy clay.
Principal products: Alfalfa, cereals, sugar beets, and potatoes.
Principal markets: Omaha, Denver, and local.

LANDS OPENED TO IRRIGATION.

No lands have been opened.
Duty of water: 2 acre-feet per acre per annum at the farm.

CHRONOLOGICAL SUMMARY.

Reconnoissance made in 1904.
Examination made August and November, 1916.
Investigation made July to October, 1917.
Surveys preparatory to construction begun August 1, 1918.
Excavation of Wyoming Canal begun January 19, 1920.
Project 4.7 per cent completed on June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Riverton project provides for the storage of the flood waters of Bull Lake and Dinwoodie Creeks, tributaries of Wind River, in Bull Lake and Dinwoodie Lake Reservoirs, respectively, and the diversion of water from Wind River by a dam about 15 miles above Pilot, Wyo., into the Wyoming Canal, for the irrigation of lands lying northeast of Wind River, west of the Big Horn River, and south of Cottonwood Creek. The flood waters of Wind River will be stored in Pilot Butte Reservior, about 10 miles below the head of the Wyoming Canal.

The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

None of the features of the project has yet been completed.

SUMMARY OF GENERAL DATA FOR RIVERTON PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		100,000
Public land withdrawn on June 30, 1921	69,000	
Indian land June 30, 1921	1,000	
Private land June 30, 1921	30,000	
Finances:		
Appropriation—		
Fiscal year 1921—		
Amount specified in appropriation act	$100,000.00	
Miscellaneous collections and transfers issued	1,981.72	
Increase of compensation	5,305.57	
Total amount authorized		$107,287.29
Encumbrances—		
Disbursements and transfers received	$94,417.89	
Current liabilities	1,840.00	
Increase of compensation	5,305.57	
Total encumbrances		101,563.46
Unencumbered balance as of July 1, 1921		5,723.83
Fiscal year 1922—		
Amount specified in appropriation act		850,000.00
Encumbrances—		
Disbursements and transfers received	$57,992.59	
Current liabilities	13,393.90	
Contingent liabilities	12,500.00	
Total encumbrances		83,886.49
Balance unencumbered as of July 1, 1921		766,113.51
Fiscal year 1923—		
Proposed appropriation		1,075,000.00
Inventories:		
Value of stock on hand		30,489.93
Value of plant and equipment in use		189,787.40
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$326,229.58	
Less revenues and adjustments	756.63	
Net cost to June 30, 1921		325,472.95
Per cent completed on June 30, 1921		4.7
Estimated per cent completed on June 30, 1922		9.6

CONSTRUCTION DURING FISCAL YEAR.

A topographic survey of the project was completed.

Two drag-line excavators were operated throughout the year on the Wyoming Canal; another machine was purchased in the spring of 1921 and was working on the Wyoming Canal at the end of the year. Excavation was completed from mile 2 to mile 5.5. Approximately 443,000 cubic yards were excavated during the fiscal year.

A telephone line 42.5 miles long was built from Riverton to the diversion dam via Pavillion.

One additional cottage was built at Riverton for renting to project-office employees.

A gatekeeper's cottage was built at the site of the Wind River Diversion Dam.

The Midvale Irrigation District, embracing nearly all the private land and the adjoining public land, was organized by order of the district court on June 1, 1921.

SETTLEMENT.

Settlement data, Riverton project, by calendar years.

Item.	1919	1920
Number of towns	2	2
Population	2,500	2,500
Number of public schools	2	2
Number of churches	7	7
Number of banks	5	5
Total capital stock	$110,000	$135,000
Amount of deposits	$1,200,000	$1,500,000
Number of depositors	2,700	2,600

FINANCIAL STATEMENT.

Condensed financial statement, Riverton project, June 30, 1921.

DEBITS.

Inventory of material and supplies on hand		$30,489.93
Plant and equipment in use		189,787.40
Current accounts receivable		24.06
Unearned value of contracts		12,500.19
Construction costs of works	$326,229.58	
Unadjusted clearing accounts	1,314.32	
Gross construction cost	327,543.90	
Less revenues and adjustments during construction period	2,070.95	
Net construction cost		325,472.95
Investment items in transit		212.03
Total debits		558,486.56

CREDITS.

Current accounts payable		15,622.00
Contingent and deferred liabilities		12,500.00
Investment (Indian and increased compensation):		
Disbursements	$376,687.65	
Collections	937.20	
Net Indian investment		375,750.45
Investment (reclamation and increase of compensation):		
Disbursements and transfer vouchers received	$172,673.49	
Items in transit	212.03	
Total	172,885.52	
Less collection vouchers and transfer vouchers issued	18,271.41	
Net reclamation investment		154,614.11
Total credits		558,486.56

Construction cost and revenues, Riverton project.

Principal features.	Fiscal year, 1921.	To June 30, 1921.
Examination and surveys	$4,746.93	$87,115.30
Storage system, Bull Lake Reservoir	22.59	7,374.42
Canal system:		
Diversion Dam surveys		15,618.91
Wyoming Canal surveys	4,081.22	11,383.12
Wyoming Canal construction	128,514.90	155,785.22
Total canal system	132,596.12	182,787.25
Permanent improvements and lands, residences	12,143.27	21,849.12
Telephone system	12,199.49	27,103.49
Total cost of construction features	161,708.40	326,229.58
Unadjusted clearing accounts	[1] 3,593.13	1,314.32
Gross construction costs	158,115.27	327,543.90
Less revenues earned during construction period:		
Rental of buildings	1,136.67	1,860.29
Hospital	116.29	[1] 128.29
Miscellaneous revenues	338.95	338.95
Total revenues	1,591.91	2,070.95
Net construction cost	156,523.36	325,472.95

[1] Contra.

Cost by calendar years, Riverton project.

	Total cost.
Year ending Dec. 31—	
1917	$2,554.80
1918	18,881.82
1919	89,424.70
1920	122,222.42
Jan. 1 to June 30, 1921	94,460.16
Total	327,543.90

Cost by fiscal years, Riverton project.

	Total cost.
Year ending June 30—	
1917	$2,292.14
1918	5,774.14
1919	52,079.21
1920	109,283.14
1921	158,115.27
Total	327,543.90

General expense, Riverton project.

Office.	Fiscal year 1921.	To June 30, 1921.
Washington office	$4,327.53	$13,675.07
Project office	9,902.93	24,553.84
Denver office	1,739.65	8,219.98
District counsel's office	53.36	1,080.46
Other offices and miscellaneous	188.72	749.33
Total	16,212.19	48,278.68
Percentage of general expense to gross cost	10.3	14.8

WYOMING, SHOSHONE PROJECT.

J. S. LONGWELL, project manager, Powell, Wyo.

LOCATION.

Counties: Park and Big Horn.

Townships: 52 to 58 N., Rs. 96 to 104 W., sixth principal meridian.

Railroad: Chicago, Burlington & Quincy.

Project cities and towns and estimated population June 30, 1921: Deaver, 150; Ralston, 25; Powell, [1]1,200; Garland, 125; Frannie, 100.

WATER SUPPLY.

Source of water supply: Shoshone River.

Area of drainage basin: 1,500 square miles.

Annual run-off in acre-feet: Shoshone River near Cody (1,500 square miles), 1903–1920, maximum 1,465,500, minimum 554,000, mean 1,097,200.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which Service is prepared to deliver water on a water-right application basis, season 1921: 65,848 acres.

Area under water-right application, season of 1920: 63,291 acres. (Includes 6 farm units, area 480 acres, upon which water-right application has been made, but on which homestead entries are pending.)

Area under water-rental contracts, season of 1920: 1,067 acres. (Includes 800 acres with alleged rights on Bitter Creek waste water, now furnished water pending outcome of litigation over these rights.)

Length of irrigating season: April 10 to November 1.

Average elevation of irrigable area: 4,500 feet above sea level.

Rainfall on irrigable area: 1907–1920; average 5.6 inches; 1920, 1.75 inches.

Ranges of temperature on irrigable area: Averages of highest annual temperatures and lowest annual temperatures 1908–1920, 98.3° F. and −20.9° F.

Character of soil of irrigable area: Light sandy to heavy clay.

Principal products: Alfalfa, wheat, oats, potatoes, sugar beets, small grains, vegetables, cattle, hogs, and dairy products.

Principal markets: Omaha, Nebr.; Kansas City, Mo.; Chicago, Ill.; Denver, Colo.; Billings, Mont.; and local.

LANDS OPENED FOR IRRIGATION.

No new lands were opened for irrigation during the fiscal year 1921.

Dates of public notices and orders relating thereto: July 17, 1918; March 11, August 21, 1919; January 28, 1920; February 14 and 21, 1920; February 14, 1921.

Location of lands opened: Tps. 54 to 57 N., Rs. 96 to 100 W., sixth principal meridian.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 2.28 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $64.50 and $69.50 on Garland Division, Part One; $65.50 and $70.50 on Garland Division, Part Two; $66.50 and $71.50 on Garland Division, Part Three; $71.50 on Garland Division, Parts Four and Five; $66 on Frannie Division, Part One; $90 on Frannie Division, Part Two, and Garland Division, Part Six; $95 on Frannie Division, Part Three, and Garland Division, Part Seven. (Garland Division, Parts One, Two, and Three, were opened at $45, $46, and $47, respectively. Supplemental construction charges since voted increase these amounts $19.50 per acre, also like amount on Garland Division, Part Four, and $12.50 on Garland Division, Part Five. Public notice of February 9, 1912, granted to Garland Division, Parts One, Two, and Three, graduated payments upon conditions of acceptance of $5 per acre additional charge. Not all water users accepted the graduated payments, hence the two charges.)

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[1] 1920 census report gives 2,463, but this includes some surrounding farms.

The annual operation and maintenance charge for 1921 is a minimum charge of $1.75 per irrigable acre whether water is used or not, under which charge water users will be entitled to receive 1½ acre-feet of water per acre; additional water will be furnished at the rate of 50 cents per acre-foot.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1903.
Construction recommended by board of engineers February 1, 1904.
Construction authorized by Secretary, February 10, 1904.
Corbett Diversion Dam completed June, 1907.
Corbett Tunnel completed November, 1907.
First irrigation by Reclamation Service, season of 1908.
Shoshone Dam completed January, 1910.

Project 56 per cent completed June 30, 1921, based on total estimated cost and 48 per cent completed based on area under public notice. Based on area for which irrigation works are now constructed this latter figure is 52 per cent, as there are 5,300 acres in Frannie Division, Part Four, and Garland Division, Part Eight, which will be opened to entry in the fall of 1921.

IRRIGATION PLAN.

The irrigation plan of the Shoshone project provides for the storage of flood waters of the Shoshone River in a reservoir controlled by Shoshone Dam about 8 miles above Cody, Wyo., and three main canals, one diverting from the reservoir and the others from the Shoshone River below the reservoir, the stream bed acting as carrier in the intervening distance. Of these, the Garland Canal is constructed, diverting from the river about 16 miles below the reservoir by means of the Corbett Diversion Dam into the Corbett Tunnel. The diversion is of 1,000 second-feet maximum capacity and is the supply for the Garland and Frannie Divisions, comprising an irrigable area of 82,600 acres, of which 71,000 acres are now irrigable, lying in the vicinity of Ralston, Powell, Garland, Mantua, Frannie, and Deaver.

The Willwood Canal will divert out of the river 6 miles below Corbett Dam. It will supply water for the 15,600 acres of irrigable area of the Willwood Division. These lands are on the south side of the Shoshone River opposite the Garland Division of the project and the towns of Powell and Garland.

The third main canal system heading at the Shoshone Dam will be for the Heart Mountain Division, and if the Oregon Basin Division is approved will also serve as the main canal to the mouth of the Shoshone Canyon, 3 miles below the dam. Diversion from the reservoir will be about 100 feet above stream bed and the canal will follow the south bank of the Shoshone Canyon to the mouth, mostly in tunnel or cut-and-cover concrete conduit section. Shoshone River crossing for the Heart Mountain Division lands will be effected by a pressure pipe. The lands of this division, comprising 38,800 acres, lie opposite Cody, Corbett, and Ralston and extend to the divide between the Shoshone and Clark Fork Rivers. The Oregon Basin Canal will continue along the south side of the Shoshone River to Oregon Basin, where storage is possible without a dam to the amount of 250,000 acre-feet. Seasonal and hold-over storage will be necessary in this reservoir if the division is made part of the project. The irrigable lands, comprising 90,000 acres, lie mostly below the reservoir on the bench lands between the Shoshone and Greybull Rivers and extend from Cody to Greybull, including the inland towns of Emblem and Burlington.

The United States claims all waste, seepage, spring, and percolating waters arising within the project and proposes to use such waters in connection therewith. Their development and use are necessary for the economical construction and certain operation of the project. To date four principal diversions of such waters have been effected—two on Bitter Creek in the Garland Division, and two on Sage Creek in the Frannie Division.

No work is now in progress on construction, but an extension of the canal and lateral system has been about completed for the irrigation of 5,045 acres in the Frannie Division, in the vicinity of Frannie, and 271 acres in the Garland Division, in the vicinity of Ralston, which lands will be opened September 16, 1921, as Frannie Division, Part Four, and Garland Division, Part Eight.

SUMMARY OF GENERAL DATA FOR SHOSHONE PROJECT.

Areas:		
Irrigable acreage when project is complete		[1] 137,000
Public land entered to June 30, 1921	61,341	
Public land open to entry June 30, 1921	829	
Public land withdrawn on June 30, 1921	62,016	
State land unsold June 30, 1921	5,552	
Railroad land unsold June 30, 1921	985	
Other private land June 30, 1921	6,277	
Acreage Service could have supplied in season of 1920		65,890
Estimated acreage Service can supply in season of 1921		65,848
Estimated acreage Service can supply in season of 1922		71,164
Acreage irrigated season of 1920		45,650
Acreage cropped under irrigation, season of 1920		44,120
Crops:		
Value of irrigated crops, season of 1920		$1,063,640
Value of irrigated crops per acre cropped		24.11
Irrigable area, 90,000 acres divided as follows:		Acres.
Public lands		86,600
State lands		2,400
Private lands		1,000
Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$459,000.00	
Unencumbered balance of previous appropriations	392,820.50	
Miscellaneous collections and transfers issued	13,114.79	
Increase of compensation	48,469.48	
Total amount authorized		$913,404.77
Encumbrances—		
Disbursements and transfers received	742,147.00	
Current liabilities	73,529.69	
Contingent liabilities	2,175.00	
Increase of compensation	48,500.58	
Total encumbrances		866,352.27
Unencumbered balance as of July 1, 1921		47,052.50
Fiscal year 1922—		
Amount specified in appropriation act		1,784,000.00
Encumbrances in fiscal year 1921—		
Disbursements and transfers received		4,022.12
Unencumbered balance as of July 1, 1921		1,779,977.88
Fiscal year 1923—		
Proposed appropriation		975,000.00
Inventories:		
Value of stock on hand		118,931.09
Value of plant and equipment in use		280,538.39
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$6,766,859.07	
Less revenues and adjustments	49,876.90	
Net cost to June 30, 1921		6,716,982.17
Per cent completed on June 30, 1921	56	
Estimated per cent completed on June 30, 1922	62	
Estimated per cent completed on June 30, 1923	70	
Value of construction water-right contracts and other resources to repay net cost of project		4,586,573.82
Revenues held in reserve		10,417.49
Operation and maintenance costs:		
Gross cost to Dec. 31, 1920	$456,122.39	
Less charges due and miscellaneous revenues	422,593.20	
Deficit		33,529.19
Drainage:		
Total cost of drainage works to June 30, 1921		953,804.35
Miles of drains built to June 30, 1921—		
Open	44.45	
Closed	92.20	
Total		136.65
Estimated acreage damaged by seepage on June 30, 1921		6,400
Estimated acreage protected by drains to June 30, 1921		30,980
Estimated acreage to be protected by authorized system		36,600

[1] The Oregon Basin, for which land has been withdrawn, but the construction of which has not yet been approved, is not included in the above tabulation. Quantities are:

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Discount.	Total.	
Construction charges	$585,788.37	$542,041.59	.....	$542,041.59	$43,746.78
Operation and maintenance charges (public notice)	414,684.05	336,441.71	$7,958.95	344,400.66	70,283.39
Supplemental construction to be paid as operation and maintenance	700.94	700.94	.....	700.94	.....
Rentals, irrigation water	9,846.41	9,445.79	.....	9,445.79	400.62
Rentals, grazing and farming lands	7,172.32	6,899.13	.....	6,899.13	273.19
Contractors' freight refunds	19,666.30	19,666.30	.....	19,666.30	.....
Miscellaneous	9,263.64	7,762.23	.....	7,762.23	1,501.41
Total	1,047,122.03	922,957.69	7,958.95	930,916.64	116,205.39

CONSTRUCTION DURING FISCAL YEAR.

Frannie Division.—Contract work during the fiscal year consisted mainly of the excavation of the lateral system to cover 5,000 acres of land which are to be opened on September 16, 1921, as Part Four of this division. The work, amounting to 45,000 cubic yards of excavation, was divided into seven schedules for the purpose of permitting bidding by local farmers. The work was awarded to five contractors at prices ranging from 18 to 27 cents for class 1 excavation. Work was started by the first contractor on August 16, 1920, and all work was completed in January, 1921.

Work by Government forces consisted principally of the construction of main canal and lateral system structures for the same area. A small amount of work on this feature had been done during the previous fiscal year. A construction camp was maintained at Frannie for this work until April 15, 1921, when the work was 95 per cent completed. The uncompleted work consisted of the construction of a crossing of the main line of the Chicago, Burlington & Quincy Railroad 2 miles north of Frannie and the priming and puddling of the system, which can not be undertaken until the crossing is completed and it is possible to carry water past this point. The work during the summer of 1920 was greatly handicapped by scarce and inefficient labor. During the fall and winter the situation improved and good progress was made, owing to favorable weather. Other construction by Government forces consisted of the completion of a diversion from Sage Creek into Deaver Canal, the construction of a wasteway from near the end of Lateral D-56, and minor extensions of the Parts One and Two lateral systems to private lands.

Willwood Division.—No direct construction work was carried on on this division during the year, but a series of test borings was made at the diversion-dam site and along the upper reach of the Main Canal, and studies of the design of that structure are under way.

Heart Mountain Division.—No direct construction was carried on on this division during the year. A trial line to determine the governing features of an extension of this canal to Pole Cat Bench was run and a rough stadia survey made to determine the area possible to cover by such an extension. The outstanding feature of the survey was that such an extension will require a pressure pipe

from 8 to 11 miles long with a maximum head of 200 to 250 feet to cover an area of from 50,000 to 55,000 acres. This area extends into Montana to a point about 1 mile north of Warren.

Power plant.—To provide electrical power for carrying on drainage work on the Garland and Frannie Divisions and the construction of the Willwood and Heart Mountain Divisions work was begun in November on the erection of an hydroelectric power plant at Shoshone Dam. The present installation will consist of two 1,000 kilovolt-ampere units with provision for the installation of an additional 3,000 kilovolt-ampere unit at a future date. The power house is to be located in the Shoshone Canyon 540 feet downstream from the Shoshone Dam. The penstock, 741 feet long, connects with the two 42-inch pipes through the base of the dam. Two 48-inch mechanically operated balanced valves are located at this point of connection with the penstock. The penstock is made up of three sections. The first section consists of two lines of cast-steel and riveted-steel pipe, each 60 inches in diameter and about 139 feet long, connecting with an 8-foot 6-inch horseshoe tunnel. The last 62 feet of the above pipes are located in tunnel section. The second section of the penstock consists of 444 feet of concrete-lined tunnel, provided with a vitrified pipe drainage system of four lines of pipe located between the concrete and the rock, one at each corner of the tunnel section. The third section of the penstock consists of 158 feet of cast-steel and riveted-steel pipe connecting with the lower end of the tunnel. This pipe has a diameter of 96 inches from the point of connection with the lined tunnel to the intake for the third unit in the power house. From the third unit intake to the east wall of the power house the pipe reduces to a diameter of 48 inches, a reduction taking place below each intake for the other two units. The lower end of the penstock at the east wall of the power house will connect to a 48-inch riveted-steel by-pass pipe, 56 feet long. At the end of the by-pass pipe will be located a 36-inch balanced needle valve. This needle valve will discharge into a tunnel 86 feet long, the lower end of which, in order to prevent spray, will be below low-water surface in the river 765 feet below the dam.

The transmission line from the power house will extend down through the project to Powell, Garland, and Deaver. Branch lines will be taken off to furnish power for construction work on the Willwood Dam and for the operation of drag lines on the Garland, Frannie, and Willwood Divisions. The power line will pass through the Heart Mountain Division and will make power available for construction work on that division when funds become available. The total length of line to be built at present is 47 miles. The power will be transmitted at a voltage of 33,000.

At the close of the fiscal year the excavation for the penstock tunnel and the power-house foundations were about completed and contracts had been awarded for the turbines, the electrical machinery, and the transmission line materials.

Water rights.—During the fiscal year an examination was made of the State engineer's records relative to the water-right permits for the project and also of all other permits and certificates of appropriation in good standing in the Shoshone River watershed. A report was prepared on the project permits and abstracts made of the other

permits for a report now under preparation covering all rights in the watershed.

Application was made for extensions of time under the State law for the permits for the Garland, Willwood, and Heart Mountain Canals, permits numbers 2111, 1191 enlargement, and 1189 enlargement. The first was extended to December 31, 1925, and the last two to December 31, 1924. There were filed with these applications amendatory and explanatory statements to make their intent clearer, especially by describing the lands intended to be covered in detail according to the Government resurvey plats.

Similar amendatory and explanatory statements were filed with permits 492 reservoir and 751 reservoir for Shoshone Reservoir and permit 10138 which is a secondary permit for Shoshone Reservoir water for Garland and Frannie Division lands. All the above-mentioned permits were filed prior to the resurvey and described lands by the now obsolete original survey, hence the new statements.

Applications for enlargements were also filed December 21, 1920, for the Garland, Willwood, and Heart Mountain Canals to cover small areas under these canals not covered by the original permits. There was also filed at that time another secondary permit under the Shoshone Reservoir permits, describing all lands of the project not included in the secondary permit 10138. The State engineer has not yet completed examination of these various instruments and hence has not yet approved them.

SEEPAGE AND DRAINAGE.

Garland Division.—Drainage work on the Garland Division was carried on during the entire year except for a shutdown during the winter. At the beginning of the year three machines were used, the Austin trencher, the Lidgerwood 1 cubic yard drag line, and the Monighan 1 cubic yard drag line. During the year a 1½ cubic yard Bucyrus gasoline drag line was obtained by transfer from the Rio Grande project, and a 2½ cubic yard Bucyrus drag line and a ½ cubic yard P. & H. drag line by purchase.

During the year 4.1 miles of closed drains and 15.5 miles of open drains were constructed. The principal work was on open drains in the North Garland area, where 4,750 acres were damaged by seepage and 4,750 acres seriously threatened at the beginning of the year. The work done during the fiscal year it is estimated has protected 3,000 acres of land. No large additional seeped areas have developed in this region during the past fiscal year. On the South Garland area the principal work was continuation of the drain X system in the Dry Lake. About 1,800 acres were protected or relieved during the year. With the exception of the Dry Lake area, of which about 350 acres are unprotected as yet, the seepage areas now existing are in small scattered patches. Here, too, there has been very little spread of seepage. On the West Garland area works were constructed to protect 400 acres of the 800 acres reported seeped.

Frannie Division.—Work was continued on the Frannie Division drainage the entire year. At the beginning of the fiscal year a 1½ cubic yard Bucyrus steam drag line was the only machine at work. During the year a Bucyrus drag line which handles a 2½ cubic yard bucket and a P. & H. drag line with a one-half cubic yard bucket were purchased and placed on this work. During the year 7.3 miles

of open drains were constructed. Soil conditions are not favorable for closed-drain construction. The work done during the year it is estimated has protected about 1,500 acres. Seepage is developing fast on this division and an active construction program will be necessary to prevent large damage. The principal areas upon which work has been done are the Howell depression north of Deaver, lands near Polecat Creek west of Deaver, and the Mantua Flat. Part of the drainage work on the Frannie Division consisted of the rectification of Sage Creek channel in the vicinity of Cowley station. The lands surrounding this work are private lands under the Sidon Canal, a Carey Act project, but the damage, which consisted of silting bottom lands of Sage Creek, resulted mostly from silt carried by waste and seepage water arising on Polecat Creek from Frannie Division lands. The work was successful and Sage Creek is now establishing a well-defined channel.

Future plans.—Money available from supplemental construction funds voted on the Garland Division will probably permit continuance of drainage work on that division for the fiscal year 1922. This work probably will give fairly complete drainage for all of the division except lands opened up as Part Six, but will not permit relief of many small scattered tracts. Money available on the Frannie Division will permit carrying on a small program for the rest of the calendar year 1921, but will not permit relief of all the larger areas now threatened, and voting of supplemental construction money for drainage will be necessary to keep large areas of this division productive.

Surrounded by lands of the Second and Third Parts of this division are two depressions embracing 950 acres of irrigable lands. These depressions are crossed by the Cody branch of the Chicago, Burlington & Quincy Railroad. Seepage from the Frannie Canal and some farm waste is filling the larger of these depressions and endangering the railroad track. It is proposed to construct, cooperatively with the railroad company, a drain for these depressions, as the irrigable area reclaimed will more than repay the cost of such construction.

ECONOMIES OF GOVERNMENT WORK.

The principal changes to effect economy during the year were the enlargement of the machine and blacksmith shop at Powell and the change from horse-drawn to motor-driven vehicles for all construction and operation work. It is impossible to place exact values on these changes, but the first change permits making practically all required repairs for the excavating and other equipment without the delay incident to waiting for repair parts to be shipped from the manufacturer. The second change not only effects a direct saving of cost in transportation but also in time, which is an important element, especially in canal operation and maintenance. Another direct result is the saving in the cost of temporary camps for outlying work, as previously it was necessary to establish camps for work more than 4 or 5 miles from headquarters, whereas now all work can be handled from the Powell and Deaver permanent camps, traveling at times a distance of 10 to 12 miles.

In the construction of closed drains the average cost for 1920 was $1.40 per linear foot, compared with $1.20 per linear foot, the pre-

vious average to date. Similar work in an adjacent drainage district cost $1.50 per foot, exclusive of the cost of tile, tile haul, manholes, and inspection.

BOARD MEETINGS.

Date.	Topic.	Personnel.
Sept. 18, 1920	Willwood Diversion Dam and Canal	Chas. P. Williams, J. L. Savage, Walter Ward, J. S. Longwell.

OPERATION AND MAINTENANCE.

The canal system on the Garland Division was operated as in previous years, water being delivered upon request of farmers until the maximum canal capacity was reached. When additional requests were received it was necessary either to wait until some one had finished irrigating or else to prorate the water to all farmers under the ditch. This method was satisfactory except in a few cases.

On the Frannie Division operation during 1920 was without unusual incident.

As in the previous year, it was necessary to draw on Shoshone Reservoir storage. This began on August 25 and continued to the end of the season.

The principal large items of maintenance work were continuation of Frannie Canal cleaning and repairs to five drops in the main canal between Alkali Creek and the Frannie Canal headgate. Frannie Canal cleaning was carried on by the Monighan drag line in July, 1920, and by a P. & H. drag line during April, May, and June, 1921. During the fiscal year 1.55 miles were cleaned, making a total of 6.3 miles of this work, or 44 per cent, to date. The five drops on the main canal are vertical drops of 6 to 10 feet. The concrete in the basins of these drops was nearly destroyed, and it was necessary to extend the paving below the drops also. The repair work to the basins was done with a cement gun.

The recovery of waste water during the peak loads has been a material help in the operation of the canal system, a maximum of 65 second-feet of water being recaptured and used at such times.

The Reclamation Service is continuing the delivery of water on a rental basis to private lands which had previously been irrigated with waste and seepage water diverted from Bitter Creek. Whether payment will be made under the rental contracts entered into with the owners will be determined when a decision is reached as to the ownership of this water; the matter has been under litigation since 1918.

Historical review, Shoshone project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service is prepared to supply water	42,816	42,623	43,265	55,296	56,119	65,890
Acreage irrigated	25,753	29,977	32,984	38,282	41,641	45,650
Miles of canal operated	247	266	286	381	415	458
Water diverted (acre-feet)	96,217	125,622	128,629	162,463	199,061	187,329
Water delivered to land (acre-feet)	54,668	70,247	68,730	84,378	117,459	113,065
Per acre of land irrigated (acre-feet)	2.12	2.34	2.10	2.29	2.81	2.50

SETTLEMENT.

No new lands were opened to settlement during the fiscal year. Very few public land farm units are vacant. Three new water-right applications for public lands were filed, covering 182 acres of irrigable land. At the end of the fiscal year there were 13 vacant farm units, covering 829 acres, of which one was recommended to be withdrawn for division among adjacent entered units. During the year two vacant farm units were withdrawn because of seepage, and one was combined with an adjacent entered farm unit.

There was little activity in the sale of Government town lots during the past fiscal year, and building construction, although active during the summer of 1920, had practically ceased. Two lots in Frannie town site and six lots in Powell town site were sold during the year. Three of the Powell town-site lots were sold at a public sale on January 18, 1921. These lots are adjacent to the Chicago, Burlington & Quincy yards and are laid out for use as industrial sites.

Settlement data, Shoshone project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of farms on project	650	646	830	823	1,009
Population	1,825	1,941	2,320	2,481	2,730
Number of irrigated farms	593	621	750	803	910
Operated by owners or managers	430	467	616	619	695
Operated by tenants	160	154	134	184	215
Population	1,825	1,941	2,320	2,481	2,730
Number of towns	3	4	5	5	5
Population	630	1,082	1,170	1,395	1,345
Total population on farms and in towns	2,455	3,023	3,490	3,876	4,075
Number public schools	6	8	10	11	12
Number of churches	7	7	8	8	8
Number of banks	3	3	5	5	6
Total capital stock	$60,000	$60,000	$75,000	$110,000	$125,000
Amount of deposits	$300,000	$488,000	$654,000	$955,000	$644,178
Number of depositors	1,290	1,500	1,875	2,500	2,605
Number of relinquishments	22	13	15	31	20

The above tabulation does not include the adjacent towns of Cody and Cowley, which share some in the business of the project.

PRINCIPAL CROPS.

Both the Garland and Frannie Divisions were cropped during the season of 1920. The total crop value of the combined area was about $1,064,000, or $24.11 per acre, compared with $1,886,977 and $46.01 for 1919. The average for the Garland Division was $27 and for the Frannie Division was $14.50. The yield per acre of the principal crops on each division was some less than in 1919, and especially on the Garland Division the average alfalfa yield was 2.19 tons per acre, against a yield of 2.69 tons the previous year. The average on the project of the principal crops was about 12 per cent less than in 1919. The increase in cropped acreage was about 8 per cent, and the decrease in average yield was, in a large measure, due to this increase in area of raw lands which produce lightly. The decrease in total value of crops, then, is a rough measure of the commodity deflation suffered.

The total area cropped in 1920 was 44,120 acres, compared with 41,016 acres in 1919. The two main crops in acreage continue to be alfalfa and wheat with acreages of 19,849 and 10,515, yields of 42,907

tons and 185,327 bushels, and values of $343,256 and $277,991, respectively. These figures show an increase in alfalfa and a decrease in wheat. The highest return per acre from any important crop was $107.45 from sugar beets, followed by $71.14 per acre from potatoes. The sugar-beet acreage was 1,530, and, owing to the fact that this crop was contracted at $12 per ton, no deflation in return to the farmers resulted, and the acreage, 3.5 per cent of the total cropped acreage, yielded in cash 15 per cent of the total crop value. The potato crop was normal in yield, but owing to early digging for fear of frost the produce suffered. The advance crop report for 1921 indicates about the same acreage in beets and about 100 per cent increase in potato acreage, with only a nominal increase in the total acreage cropped on the project.

Crop report, Garland Division, Shoshone project, Wyoming, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	17,140	Ton	37,562	2.19	$8.00	$300,496	$17.54
Alfalfa seed	34	Bushel	16	.47	6.00	96	2.82
Barley	175	...do	4,663	27.00	1.70	7,927	45.30
Beans	10	...do	42	4.2	4.80	202	20.10
Beets, sugar	1,504	Ton	13,467	8.96	12.00	161,604	107.45
Clover hay	55	...do	26	.47	10.00	260	4.73
Clover seed	1,385	Bushel	3,591	2.59	6.00	21,546	15.56
Corn	15	...do	395	26.00	1.50	593	39.60
Corn fodder	18	Ton	48	2.70	10.00	480	27.00
Garden	262					24,337	92.90
Oat hay	117	Ton	78	.66	10.00	780	6.70
Oats	3,114	Bushel	82,384	26.46	.70	57,667	18.52
Onions	4	...do	440	110.00	1.50	660	165.00
Pasture	2,508					40,559	16.19
Potatoes	1,104	Bushel	174,520	158.07	.45	78,534	71.14
Rye	14	...do	350	25.00	3.00	1,050	75.00
Wheat	7,385	...do	154,636	20.94	1.70	231,954	31.41
Miscellaneous	6					355	59.00
Total cropped	34,850	Total and average				929,100	27.00
Irrigated, no crop:							
Nonbearing orchard	40						
Young alfalfa	1,040						
Ground fall-plowed	70						
Miscellaneous	60						
Less duplicated areas	870						
Total irrigated	35,190						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	41,384.37	649	.....
Total irrigated area farms reported	35,190.00	649	.....
Under water-right applications	34,599.50	644	.....
Under rental contracts	60.00	1	.....
Water right in litigation	516.00	4	.....
Total cropped area farms reported	34,850.00	649	.....

Crop report, Frannie Division, Shoshone project, Wyoming, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	2,709	Ton	5,345	1.97	$8.00	$42,760	$15.78
Alfalfa seed	12	Bushel	5	.41	6.00	27	2.30
Barley	19	do	223	11.73	1.70	379	19.95
Beets, sugar	26	Ton	125	4.80	12.00	1,500	57.41
Clover hay	127	do	145	1.14	10.00	1,450	11.40
Clover seed	742	Bushel	2,013	2.71	6.00	12,078	16.28
Corn	23	do	256	11.13	1.50	384	16.70
Corn fodder	56	Ton	66	1.19	10.00	660	11.80
Garden	59					4,955	84.00
Hay, oat	162	Ton	140	.86	10.00	1,400	8.64
Millet seed	3	Bushel	18	6.00	6.00	108	36.00
Oats	1,744	do	25,251	14.48	.70	17,676	10.14
Pasture	380					3,175	8.37
Potatoes	67	Bushel	3,865	57.70	.45	1,739	25.95
Rye	3	do	24	8.00	3.00	72	24.00
Wheat	3,130	do	30,691	9.82	1.70	46,037	14.73
Spelt	8	do	140	17.00	1.00	140	17.00
Total cropped	9,270	Total and average				134,540	14.50
Irrigated, no crops:							
Nonbearing orchard	8						
Young alfalfa	2,185						
Ground, fall-plowed	572						
Miscellaneous	940						
Less duplicated area	2,515						
Total irrigated	10,460						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	18,046.52	261	.....
Total irrigated area farms reported	10,460.00	261	.....
Under water-right applications	10,280.00	258	.....
Under rental contracts	180.00	3	.....
Total cropped area farms reported	9,270.00	261	.....

PUBLIC NOTICE AND ORDER.

PUBLIC NOTICE, FEBRUARY 14, 1921.

Annual operation and maintenance charges.—In pursuance of section 4 of the act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1921 and thereafter until further notice against all lands of the Shoshone project, Wyoming, under public notice, shall be a minimum charge of $1.75 per irrigable acre whether water is used thereon or not, under which charge water users will be entitled to receive 1½ acre-feet of water per acre; that additional water will be furnished at the rate of 50 cents per acre-foot. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Shoshone project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$1,675.99
Inventory of materials and supplies on hand			118,931.09
Plant and equipment in use			280,538.39
Current accounts receivable			116,205.39
Construction charges not due			3,999,487.34
Unearned value of contracts			46,200.00
Construction cost of works		$6,745,180.65	
Operation and maintenance added to construction		147.75	
Operation and maintenance during construction		21,530.67	
Gross construction cost		6,766,859.07	
Less revenues and adjustments during construction period		49,876.90	
Net construction cost			6,716,982.17
Operation and maintenance cost under public notice	$508,853.39		
Less operation and maintenance added to construction	147.75		
Gross operation and maintenance cost		508,705.64	
Less revenues and adjustments		422,049.99	
Deficit to Dec. 31, 1920	33,529.19		
Net cost Jan. 1 to June 30, 1921	53,126.46		
			86,655.65
Investment items in transit			2,030.57
Total debits			11,368,706.59

CREDITS.

Current accounts payable			74,333.79
Contingent and deferred liabilities			47,875.99
Resources for repaying cost of project			4,586,573.82
Revenues held in reserve			10,417.49
Investment:			
Disbursements and transfers from other projects	$7,896,861.37		
Items in transit	1,653.48		
Total		$7,898,514.85	
Less collections and transfers to other projects	1,159,386.44		
Items in transit	[1] 377.09		
Total		1,159,009.35	
Net investment			6,649,505.50
Total credits			11,368,706.59

Construction cost and revenue, Shoshone project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys: Project as a whole	$5,912.95	$75,327.38
Storage system: Shoshone Dam	[1] 1.86	1,671,853.37
Canal system:		
Garland Division	.....	2,014,431.45
Frannie Division	44,294.88	424,476.48
Willwood Division, surveys	8,894.46	27,077.44
High Line Division, surveys	83.46	34,643.11
Oregon Basin, surveys	114.36	16,639.23
Total canal system	53,387.16	2,517,267.71
Lateral system:		
Garland Division	.....	312,188.99
Frannie Division	79,408.07	707,940.80
Willwood Division, surveys	[1] 58.00	1,912.04
High Line Division, surveys	.....	6,903.49
Total lateral system	79,350.07	1,028,945.32
Drainage system:		
Garland D vision	160,972.52	912,715.31
Frannie Division	63,277.16	82,434.45
Total drainage system	224,249.68	995,149.76
Power system	126,660.14	126,660.14

[1] Contra.

Construction cost and revenues, Shoshone project—Continued.

Features.	Fiscal year, 1921.	To June 30, 1921.
Farm units:		
Garland Division, surveys	$611.77	$12,329.18
Frannie Division, surveys	5,289.32	19,850.22
Willwood Division, surveys	54.22	3,036.12
Total farm units	5,955.31	35,215.52
Permanent improvements:		
Garland Division	6,408.79	46,926.37
Frannie Division	266.88	42,590.14
Shoshone Dam	.....	136,220.44
Willwood Division	454.93	454.93
Total permanent improvements	7,130.60	226,191.88
Telephone system:		
Garland Division	7.60	5,013.71
Frannie Division	1,565.90	8,491.99
Shoshone Dam	36.27	5,794.55
Total telephone system	1,609.77	19,300.25
Operation and maintenance during construction	.....	21,530.67
Miscellaneous supplemental construction	.....	49,269.32
Operation and maintenance added to construction	.....	147.75
Unadjusted clearing account	25.24	.....
Gross construction cost to June 30, 1921	504,279.06	6,766,859.07
Less revenues earned during construction period:		
Rentals of buildings	3,017.20	29,097.17
Rentals of irrigation water	.....	132.00
Freight refunds	.....	19,666.30
Other revenues (unclassified)	5,603.04	8,850.04
Loss, hospital operation	968.80	[1] 818.53
Losses on farming operations	.....	[1] 3,741.47
Uncollectible accounts	[1] 78.31	[1] 78.31
Field cost adjustments	[1] 3,230.30	[1] 3,230.30
Subtotal	6,280.43	49,876.90
Net construction cost to June 30, 1921	497,998.63	6,716,982.17

[1] Contra.

Operating cost and revenue, Shoshone project.

Features.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
COSTS.						
Storage works:						
Shoshone Dam and Reservoir	$2,431.16	$100.70	$2,531.86	$28,873.90	$12,115.33	$40,989.23
Maintenance of buildings	.....	.....	.....	.....	158.91	158.91
Shoshone Reservoir highway	.....	.....	.....	.....	196.83	196.83
	2,431.16	100.70	2,531.86	28,873.90	12,471.07	41,344.97
Canal system:						
Garland Division 1 and 2	1,692.36	3,793.60	5,485.96	26,615.22	22,591.07	49,206.29
Garland Division 3 and 4	12.67	1,594.69	1,607.36	1,973.34	9,484.26	11,457.60
Frannie, Garland Division	29.45	6,126.98	6,156.43	2,817.00	8,754.70	11,571.70
Frannie, Frannie Division	1,058.21	1,438.14	2,496.35	2,310.32	1,968.55	4,278.87
Corbett Diversion Dam	.....	.....	.....	3,804.01	1,206.18	5,010.19
Relining Corbett Tunnel	.....	.....	.....	.....	9,029.11	9,029.11
Ralston Tower	.....	.....	.....	.....	316.35	316.35
Maintenance bridges, main canal	.....	.....	.....	.....	261.63	261.63
	2,792.69	12,953.41	15,746.10	37,519.89	53,611.85	91,131.74

Operating cost and revenue, Shoshone project—Continued.

Features.	Calendar year 1920.			To Dec. 31, 1920.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Lateral system:						
Garland Division	$10,546.90	$15,468.80	$26,015.70	$94,895.50	$99,048.13	$193,943.63
Frannie Division	5,535.24	19,508.23	25,043.47	15,817.79	30,687.84	46,505.63
Buildings Garland Flat					354.78	354.78
Surface drains		74.50	74.50	74.68	2,678.67	2,753.35
Recapturing waste water				303.81	85.46	389.27
Determining seeped areas					1,505.62	1,505.62
Bridges, culverts, and roads					862.14	862.14
	16,082.14	35,051.53	51,133.67	111,091.78	135,222.64	246,314.42
Drainage:						
Open drains		181.23	181.23	886.90	4,336.71	5,223.61
Closed drains		1,808.75	1,808.75	1,169.38	9,426.42	10,595.80
		1,989.98	1,989.98	2,056.28	13,763.13	15,819.41
Miscellaneous:						
Damage claims	425.20		425.20	430.00		430.00
Proposed irrigation district		98.49	98.49		709.58	709.58
Ditch riders' camps		2,745.88	2,745.88		2,745.88	2,745.88
	425.20	2,844.37	3,269.57	430.00	3,455.46	3,885.46
Undistributed expense: Overhead	10,357.58	22,249.90	32,607.48	21,093.75	36,680.39	57,774.14
Total	32,088.77	75,189.89	107,278.66	201,065.60	255,204.54	456,270.14
Less unpaid operation and maintenance charges added to construction						147.75
Balance						456,122.39
REVENUES.						
Operation and maintenance repayments under contracts with water users:						
Charges due			100,556.73			414,896.49
Interest and penalties			1,214.66			3,828.82
Water rentals			1,762.72			9,038.27
Rental of lands and buildings			85.00			621.26
Other revenues (unclassified)			266.44			447.19
Discounts			[1] 2,003.89			[1] 6,238.83
Total			101,881.66			422,593.20
Difference deficit			5,397.00			33,529.19

[1] Contra.

Cost by calendar years, Shoshone project.

Year ending Dec. 31—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1907 and prior	$2,238,120.02			$2,238,120.02				$2,238,120.02
1908	710,703.69			710,763.69	$8,808.76		$8,808.76	719,512.45
1909	413,333.86			413,333.86	15,278.27		15,278.27	428,612.13
1910	223,696.61			223,696.61	14,580.19		14,580.19	238,276.80
1911	190,108.54			190,108.54	20,525.05		20,525.05	210,633.59
1912	189,586.50			189,586.50	22,435.24		22,435.24	212,021.74
1913	116,434.16			116,434.16	29,708.59		29,708.59	146,142.75
1914	176,764.14	$147.75		176,911.89	21,525.70	$147.75	21,377.95	198,289.84
1915	213,377.99			213,377.99	23,186.20		23,186.20	236,564.19
1916	299,283.07			299,283.07	28,531.71		28,531.71	327,814.78
1917	549,739.48		$2,357.07	552,096.55	35,583.88		35,583.88	587,680.43
1918	285,413.70		15,551.00	300,964.70	62,353.38		62,353.38	363,318.08
1919	524,105.98		3,622.60	527,728.58	66,474.51		66,474.51	594,203.09
1920	313,540.53			313,540.53	107,278.66		107,278.66	420,819.19
Jan. 1 to June 30, 1921	300,972.38			300,972.38	52,583.25		52,583.25	353,555.63
Total	6,745,180.65	147.75	21,530.67	6,766,859.07	508,853.39	147.75	508,705.64	7,275,564.71

Cost by fiscal years, Shoshone project.

Year ending June 30—	Construction.				Operation and maintenance.			Grand total.
	Original.	Operation and maintenance added.	Operation and maintenance during.	Total.	Original.	Less operation and maintenance added to construction.	Gross.	
1907 and prior	$1,601,311.42			$1,601,311.42				$1,601,311.42
1908	1,054,541.82			1,054,541.82	$5,274.65		$5,274.65	1,059,816.47
1909	412,384.78			412,384.78	8,913.31		8,913.31	421,298.09
1910	439,389.17			439,389.17	16,711.14		16,711.14	456,100.31
1911	205,630.95			205,630.95	17,982.75		17,982.75	223,613.70
1912	121,766.29			121,766.29	20,917.99		20,917.99	142,684.28
1913	154,406.51			154,406.51	24,908.23		24,908.23	179,314.74
1914	149,693.27			149,693.27	30,040.27		30,040.27	179,733.54
1915	234,567.81	$147.75		234,715.56	18,736.00	$147.75	18,588.25	253,303.81
1916	217,357.16			217,357.16	25,695.79		25,695.79	243,052.95
1917	409,903.10		$2,357.07	412,260.17	33,107.76		33,107.76	445,367.93
1918	451,916.58		15,551.00	467,467.58	51,423.24		51,423.24	518,890.82
1919	574,323.49		3,622.60	577,946.09	57,000.35		57,000.35	634,946.44
1920	213,709.24			213,709.24	96,380.58		96,380.58	310,089.82
1921	504,279.06			504,279.06	101,761.33		101,761.33	606,040.39
Total	6,745,180.65	147.75	21,530.67	6,766,859.07	508,853.39	147.75	508,705.64	7,275,564.71

General expense, Shoshone project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance.	Total.	Construction.	Operation and maintenance.	Total.
Washington office	$10,263.93	$3,991.53	$14,255.46	$115,524.92	$23,332.66	$138,857.58
Project office	16,018.10	6,229.27	22,247.37	309,536.01	72,373.26	381,909.27
Denver office	4,983.12	1,933.72	6,916.84	58,975.55	6,127.50	65,103.05
District counsel's office	1,322.46	653.32	1,975.78	9,358.86	3,097.49	12,456.35
Other offices				15,361.23	2,891.07	18,252.30
Total	32,587.61	12,807.84	45,395.45	508,756.57	107,821.98	616,578.55
Percentage of general expense to gross cost	6.5	12.6	7.5	7.6	20.3	8.5

SECONDARY PROJECTS AND PROPOSED PROJECT EXTENSIONS.

NOTE.—Only brief descriptions are here given of secondary projects, upon which no work was done during the fiscal year, but references are made to earlier reports, where more complete descriptions or discussions may be found. Attention is called to the fact that complete sets of the Reclamation Service Annual Reports can generally be consulted in depository libraries in the several States, where references may be looked up if desired.

ARIZONA.

BOULDER CANYON RESERVOIR INVESTIGATIONS.

In November, 1920, a party of United States Reclamation Service officials, including the director and chief engineer, made a trip down the Colorado River from Boulder Canyon to Needles, Calif., to inspect possible dam sites. The conclusion reached was that explorations should be limited to Boulder and Black Canyons.

Topographic surveys were made by the field forces of the United States Geological Survey covering the upper end of the reservoir and that portion of the reservoir lying between Boulder and Black Canyons. Detail surveys were also made of Boulder and Black Canyons.

A road was built to Boulder Canyon, where a diamond drill camp was established. Equipment was hauled in via St. Thomas, Nev., and drilling operations started in September. Work was discontinued on May 27, 1921, on account of unfavorable working conditions.

Two dam sites in Boulder Canyon were investigated and explored in a preliminary way with diamond drills. The two sites are about 2,900 feet apart, the upper one being some 3,500 feet downstream from the head of the canyon as determined by Boulder Wash.

The results of the investigations indicate that bedrock will be found at depths not exceeding 140 feet below low-water surface. At the lower or A site the greatest depth at which bedrock was reached is 137 feet, while at the upper or C site it was reached at 130 feet. In general the river trench is filled with about 50 feet of boulders overlaid by 70 feet of sand. Twelve vertical holes were put down at the A site, the deepest of which penetrated bedrock to a depth of 66 feet. At the C site 15 vertical holes and 3 angle holes were drilled. The deepest vertical hole penetrated bedrock 50 feet. The longest hole drilled at an angle under the river was 460 feet. In all cases the rock was found to be a fine-grained granite of excellent quality, although jointed to a considerable extent.

A geological examination of Boulder Canyon and Black Canyon was made by Geologist F. L. Ransome, of the United States Geological Survey. In report of February 10, 1921, he pronounces the dam sites in both canyons as geologically feasible for the construction of a high dam.

During the year studies have been made of water supply, irrigation storage, flood detention storage, silt storage, and power development. Numerous designs and estimates of cost have been prepared in the Denver office, including reservoirs of various capacities, the largest of which contains 31,400,000 acre-feet. Gravity, constant-radius arch,

variable-radius arch, and rock-fill dams were studied. The studies show a dam located in Boulder Canyon to be more economical than one in Black Canyon.

A board of engineers, of which Consulting Engineer A. J. Wiley, Consulting Engineer James Munn, Designing Engineer J. L. Savage, and Engineer Walker R. Young were members, met at Boulder Canyon on May 13, 14, and 15, 1921, to consider the preliminary investigations, tentative designs, and cost estimates of the Boulder Canyon Dam. In report of May 26, 1921, the board considers that the gravity type built on a curved plan is the more conservative design and better suited to a dam of such an unprecedented height—735 feet above foundation for the maximum reservoir considered. The upper site was selected as most feasible, for the reason that it offers many practicable advantages over the lower site from a construction standpoint. The conclusions reached by the board were that a dam in Boulder Canyon for the combined purposes of flood control, irrigation storage, and power development is physically practicable and financially feasible; that all possible information should be secured before final plans are decided upon; and that the preliminary investigations have located the dam site within such narrow limits that further drilling can be confined to the area to be occupied by the base of the dam and cofferdams. The recommendation made was that the area below the river level at the C dam site should be further explored by drilling at least 35 holes to bedrock.

The investigations were made under the direction of Engineer Walker R. Young.

References: 1st annual report, page 109; 19th annual report, page 412.

COOPERATIVE WELL DRILLING, MOHAVE COUNTY.

An agreement was made with the State of Arizona, dated April 19, 1916, to assist the State and Board of Supervisors of Mohave County in sinking or drilling a well in Hualpai Valley, located in northwestern Arizona, for the purpose of obtaining information as to the possibility of securing subterranean water for irrigation by means of artesian wells. After drilling 1,040 feet the contractors abandoned the work. No artesian water was developed at any point. On February 15, 1918, proposals for continuing the work were issued, but no bids were received and further investigation has been suspended.

References: 16th annual report, page 348; 17th annual report, page 381.

LITTLE COLORADO RIVER PROJECT.

References to this proposed project, which contemplates the irrigation of land in the vicinity of Winslow, Navajo County, Ariz., will be found in the 3d annual report, page 174, and the 15th annual report, page 508.

A further examination of the project was made by the Reclamation Service in September, 1920.

There are approximately 60,000 acres of irrigable land within the project outside the Navajo Indian Reservation, about 1,500 acres of which are now more or less successfully irrigated by private enterprises.

Water for irrigation must come from the flow of the Little Colorado River and from artesian wells. Storage will be required. The most promising reservoir sites are the Forks or Navajo on the Little Colorado just above the town of Woodruff, having a capacity of 147,900 acre-feet with a dam 85 feet high, and the Apache, to be fed from Chevelon Creek, with an estimated capacity of about 90,000 acre-feet. Nothing is known of foundation conditions at the proposed dam sites for these reservoirs, and a geological examination should be made before any storage works are constructed. Discharge records on the Little Colorado are very meager, being available only for the year 1906 and portions of the years 1905 and 1907. Existing wells do not indicate a large supply of underground water.

Until more information is secured relative to water supply, both surface and underground, it is impracticable to determine the probable area that can be irrigated or the financial feasibility of the project.

PARADISE-VERDE.

Located in the south-central portion of the State near to and north of the Salt River project. The Paradise-Verde Irrigation District proposes to irrigate about 95,000 acres of land from the Verde River, Cave Creek, and New River, with storage in Camp Verde, Horseshoe, and other reservoir sites. By contract dated May 21, 1920, the Secretary of the Interior authorized the Paradise-Verde Irrigation District to proceed with the construction of the Camp Verde and Horseshoe reservoir sites, withdrawn under the reclamation act.

Reference: 18th annual report, page 383.

PARKER PROJECT.

This project involves a diversion from the Colorado River near Parker, Ariz., for the irrigation of 76,000 acres of land in the Colorado River Indian Reservation. Approximately 3,500 acres are now being irrigated with water pumped from the Colorado River, and it is expected that this area will be extended to cover some 10,000 acres of land by the Indian Service. On account of the variable flow of the river and the irrigation demands of land now under cultivation, it will be necessary to delay the construction of a large project until storage has been provided on the upper Colorado.

References: 9th annual report, page 71; 10th annual report, page 72.

SAN CARLOS PROJECT.

For previous accounts of this project, the following references are given: Senate Doc. No. 27, 54th Cong., 2d sess.; Geological Survey Water-Supply and Irrigation Paper No. 33; 1st annual report, page 81; 2d annual report, page 88; 3d annual report, pages 61 and 155; 4th annual report, page 82; and 19th annual report, page 411; House Doc. 791, 63d Cong., 2d sess., 1914; report to the Secretary of War of a board of engineer officers, United States Army, under Indian appropriation act of August 24, 1912.

The proposed area of the project is 60,000 acres net in the Florence-Casa Grande Valley and 40,000 acres net in the Gila River Indian Reservation. The proposed plan contemplates the construction of the San Carlos Reservoir; the Florence Diversion Dam and a gravity

canal system for the Florence-Casa Grande Division; the Sacaton Diversion Dam and gravity canals therefrom for the Reservation Division; a feeder canal from the upper division to the lower division; a power plant at the San Carlos Dam with transmission line to pumping plants on the project; and pumping plants for ground-water developments throughout the area.

The mean annual run-off of the Gila River at San Carlos was 431,000 acre-feet for the period 1895–1919, inclusive, and at Red Rock, N. Mex., 115,000 acre-feet for the period 1905–1917, inclusive. The duty of water at the land is estimated to be 3 acre-feet per acre. With storage, it is estimated there is a sufficient gravity supply to irrigate 70,000 acres and a ground-water supply and feasible pumping possibilities for 30,000 acres.

San Carlos Reservoir.—A capacity of 710,000 acre-feet will provide for the project and silt storage for 30 years. A reservoir of this capacity would have controlled all the water of the Gila River at San Carlos for 21 years of the period 1892 to 1919, inclusive. It is feasible, however, to care for future silt storage for 500 years by raising the height of dam to 260 feet above the bed of the stream.

A survey made in 1920 to contour 2,575 shows a capacity of 1,577,000 acre-feet. This would require the spillway crest at elevation 2,536 or 228 feet above the river bed. A relocation of about 30 miles of the Arizona Eastern Railway was surveyed and found feasible, though it would form a considerable item in the total cost of the project.

At the lower dam site, the maximum depth to bedrock was found to be 74 feet. At the upper dam site, 1,000 feet above the lower site, bedrock was found at a maximum depth of only 20 feet. The upper site, though wider, is an excellent site for a masonry dam of gravity type and straight alignment, and is considered the most feasible storage site on the project.

In addition to the San Carlos site the following reservoir sites may be considered for supplemental storage:

Alma Reservoir site.—436,000 acre-feet capacity; bedrock 42 feet below water level. This site is 72 miles from Silver City and 70 miles from Tyronne. The old town of Alma is in the reservoir site. A masonry arch dam 226 feet in height is proposed.

Red Rock Reservoir.—Capacity of upper site 166,000 acre-feet, lower 234,000 acre-feet. The upper site with a height of 121 feet above low water is favored; the canyon is 150 feet wide at the river bed and 100 feet high. Depth to bedrock is 102 feet.

Lower Cliff Reservoir site.—Height of dam 200 feet above the river bed; capacity 212,000 acre-feet.

Cliff Reservoir site.—No survey was made, except at the dam site. The canyon is 430 feet wide at river bed and 1,070 feet at height 150 feet. It is estimated that the run-off at Cliff is about 95 per cent of that at Red Rock.

Reservoirs above the San Carlos site are not essential to the feasibility of the San Carlos project, but such sites should be reserved for future use.

SAN PEDRO PROJECT.

Located in southeastern Arizona along the San Pedro River, near Benson, Cochise County, the plan proposes a reservoir near the

abandoned town of Charleston and the irrigation of lands in the valley below. The source of water supply is from the San Pedro River, which heads in Mexico. Investigation and report was made by Henry R. Evans and also by W. T. Lee.

Reference: 3d annual report, page 157.

SENTINEL PROJECT.

Located in the southwestern corner of the State, plans the irrigation of a large body of land in Yuma and Maricopa Counties on both sides of the Gila River, which is the source of water supply. The dam site for storage reservoir is located about 12 miles above the town of Sentinel. Test borings of the dam site indicate that suitable foundations for a masonry structure do not exist and that the great expense of storage added to the construction cost of distribution systems would probably be prohibitive.

Reference: 18th annual report, page 383.

CALIFORNIA.

CUYAMACA WATER CO.

See (California) San Diego River.

DIXON (PUTAH CREEK) PROJECT.

This project is located in Solano and Napa Counties, central California. In early investigation it was considered a part of the Sacramento Valley project.

The proposed project embraces 50,000 acres lying in the northeastern part of Solano County along the line of the Southern Pacific Railway and south of Putah Creek. The reservoir, regarded as the most feasible, is known as the Monticello, on Putah Creek in Napa County, capacity 130,000 acre-feet. A diversion dam some distance below the reservoir will be required. All of the land is in private ownership, and more than half of it in tracts exceeding 160 acres.

References: 2d annual report, page 101; 3d annual report, page 66; 4th annual report, page 90; 5th annual report, page 94; 18th annual report, page 386.

HONEY LAKE PROJECT.

Located in northeastern California, in Lassen County, on the east side of the Sierra Nevada Range, a reconnaissance was made and reported upon in the 2d annual report, page 114. Under an agreement with the Southern Lassen Irrigation Association an investigation of the project was begun in 1915 by the Reclamation Service, but as the association failed to keep its agreement to contribute half the expense of investigation, work was suspended before the examination was completed.

The project as proposed is to lower the level of Eagle Lake 50 feet by a tunnel about 14,000 feet long, discharging into Willow Creek, with other minor storages considered on upper Susan Creek; a water supply for about 25,000 acres in Susan Creek and Honey Lake Valleys, in addition to that already irrigated, may be developed. A possible future development of 30,000 acres more may be considered by pump-

ing, but at a cost regarded as prohibitive at this time. No water-power development was considered, other than a proposed head of about 70 feet at the tunnel outlet, which might be used for pumping when the value of the land would justify it.

References: 2d annual report, page 114; 15th annual report, page 508.

IMPERIAL VALLEY PROJECT.

(See also Arizona, Boulder Canyon Investigations.)

Located in Imperial County, Calif., just north of the State line, the irrigable area of the Imperial Irrigation District contains about 515,000 acres and outside of the district about 270,000 acres, nearly 80 per cent of which can be reached by gravity, in addition to which there will be 30,000 acres in Mexico. The source of supply is the Colorado River. The urgent problems of the Imperial Valley and the regions adjacent thereto are flood protection and the security of a water supply for lands now irrigated and for additional areas to be added to the present development. It has been proposed to take a canal from the Laguna Dam of the Yuma project of the United States Reclamation Service above Yuma and carry it into the Imperial Valley. This would cover a large additional area, but its construction is very expensive. On the line topographically most advantageous it would pass through Mexico, but even this line would require much heavy cutting through the intervening ridge in order to reach the necessary elevation. For the full development of all the lands that can be reached by gravity and reasonable pumping lifts from the lower Colorado River, large storage capacity will be required, estimated at about 10,000,000 acre-feet, if provided by a reservoir below the Grand Canyon in the Colorado. This must be increased by at least 2,000,000 acre-feet if the storage is provided above the canyon on account of the unavoidable losses due to the impossibility of regulating the flow in exact accordance with the needs of irrigation from a reservoir so far distant, and for other reasons. A reservoir site has been surveyed on the northern boundary of Arizona below the mouth of the Virgin River known as the Boulder Canyon site. The surveys show a basin of large capacity provided a high dam is constructed; although the dam-site borings have not been completed the site appears to be worthy of further investigation. The most feasible reservoir sites on the upper river and tributaries yet explored are the following: Flaming Gorge, Green River, capacity, 3,120,000 acre-feet; Juniper, Yampa River, capacity, 1,500,000 acre-feet; and Dewey, Grand River, capacity, 2,270,000 acre-feet. In all these cases bedrock has been found at reasonable depth. The storage capacity furnished by these upper reservoirs would be sufficient for the additional lands immediately adjacent to Imperial Valley, but would not be sufficient for all the lands in Mexico that could be irrigated.

During the past year investigations undertaken in cooperation with the Imperial Irrigation District, the Coachella Valley County Water District, the Palo Verde Irrigation District, and the State of Arizona have resulted in much valuable information in connection with the foundations at two of the several possible dam sites as well as additional information in connection with the irrigable areas and the proposed irrigation development in general. A further report is in preparation bringing the results of the investigation up to date.

References: 4th annual report, page 102; 17th annual report, page 381; 18th annual report, page 584; 19th annual report, page 417; report of the All-American Canal Board, July 22, 1919, together with the report of the engineer in charge of the surveys and examinations, June 17, 1919; preliminary report on problems of Imperial Valley and vicinity, 66th Congress, 3d session, House of Representatives, printed for use of the Committee on Irrigation of Arid Lands, 1921.

IRON CANYON PROJECT.

This project is located in northern California in the Valley of the Sacramento River, which is the source of water supply. It is proposed to irrigate about 225,000 acres of land in Tehama and Glenn Counties on the west side of the river with a small area on the east side. Storage by means of a dam in Iron Canyon will be necessary. The project is considered to be feasible, but the cost per acre will be high. It has been the subject of a number of investigations and reports in the past, the latest being made by the Reclamation Service in cooperation with the State of California and the Iron Canyon Project Association in 1919, under an agreement dated May 5, 1919. This examination may be considered as a continuation of the investigations made by the Service in 1914 under a cooperative agreement with the Iron Canyon Project Association, dated October 6, 1913.

The various features of the investigations undertaken have been explorations for a dam site by means of test borings, drifts, and geologic studies, location of main canal, studies of water supply, duty of water, irrigable area, etc., and an estimate of the cost of the project. Some combination of the various possible plans may be found by which the cost per acre would be less than is estimated and equally good or better lands served.

References: Report on Iron Canyon project by Homer J. Gault and W. F. McClure, May, 1920; report on Iron Canyon project by E. G. Hopson, October, 1914; 14th annual report, page 64; 15th annual report, page 510; 18th annual report, page 385; 19th annual report, page 412. Earlier annual reports refer to Iron Canyon under Sacramento Valley projects.

JESS VALLEY PROJECT.

Located in northern California, the project contemplates the irrigation, by storage and gravity, of about 25,000 acres of land in the valley of the South Fork of Pit River to the south of Alturas. The source of water supply is from the South Fork of Pit River in and above Jess Valley and from Parsnip Creek. The proposed Jess Valley Reservoir site has a capacity of 68,000 acre-feet. This reservoir has been mentioned in the earlier annual reports in connection with the Sacramento Valley investigations and in later reports in connection with Pit River Basin investigations.

References: 14th annual report, page 64, Pit River Basin investigations; 15th annual report, page 512, Pit River investigations; 19th annual report, page 416, Jess Valley project.

KINGS RIVER PROJECT.

Located in south-central California in Fresno, Tulare, and Kings Counties is an area of about 400,000 acres practically all in private

ownership, and nearly all irrigated from the unregulated flow of Kings River and its tributaries. The water supply is inadequate the latter part of the season, and it is proposed to construct a reservoir on Kings River with a capacity of about 600,000 acre-feet, which will provide seasonal regulation and in addition make possible the development of a large amount of power for use in lowering the water plane in the water-logged areas. The pumped water can be used for irrigation upon adjacent areas. The site is known as the Pine Flat Reservoir.

References: U. S. Geological Survey Water-Supply and Irrigation Paper No. 58; 2d annual report, page 53; H. Doc. No. 262, 66th Cong., 1st sess., Development of Unused Lands, 1919.

LOWER PIT RIVER PROJECT.

Located in northern California, it is proposed to divert water from lower Pit River to about 55,000 acres of land east and northeast of Redding on the east side of the Sacramento River, extending from the vicinity of Redding to and including Cow Creek Valley. The plan includes a diversion dam on Pit River about 8 miles above its mouth, raising the water 126 feet, with a tunnel 13,000 feet long through the ridge separating the Pit River Basin from the Sacramento Basin proper. Storage will be required, although the low-water flow of Pit River at the proposed diversion is several times the amount required for the irrigation of the area proposed. The storage is required only to supplement the short period of low water in Sacramento River as affecting navigation interests. Several reservoir sites have been considered, but no definite conclusion has been reached. At the diversion dam proposed it will be possible to develop hydroelectric power. The project is not considered feasible as a private enterprise by reason of the diverse character of the ownership and the heavy initial investment necessary.

References: 14th annual report, page 64; 15th annual report, page 511; also under Cooperative Investigations in California, report on Lower Pit River project, July, 1915.

OAKDALE AND SOUTH SAN JOAQUIN DISTRICT.

These districts have a common source of water supply and are jointly interested in the principal structures now in use. The project is located near the central part of the State in Stanislaus, Calaveras, and San Joaquin Counties. The source of water supply is the Stanislaus River. It is proposed to construct a dam in the rocky gorge of the Stanislaus River for the storage of water in what is known as the Oakdale Reservoir to supply the deficit in the latter part of the season. The capacity will be about 150,000 acre-feet, depending upon the height of the dam.

OWENS VALLEY PROJECT.

Owens Valley is situated in the eastern-central part of California, in Inyo County, on the eastern slope of the Sierra Nevada. Investigations were made of this project during the earlier years of the Reclamation Service work. In accordance with the act of Congress approved June 30, 1906 (34 Stat., 801), the project was abandoned for the use of the city of Los Angeles. Under date of March 29, 1920, a contract was entered into with the city of Los Angeles for investi-

gations as to the feasibility and cost of the Owens Valley project. A preliminary report was made September, 1920, which indicates that waters of Mono Basin can be brought into Owens Valley, there using it for power and for irrigation below the power plants. On the basis of this report the aqueduct engineers of Los Angeles desired to have the Reclamation Service take up detailed surveys of the project. To this end a supplemental agreement with the city of Los Angeles was made March 9, 1921, and a final report upon the project is now in course of preparation.

References: 3d annual report, pages 199–202; 19th annual report, page 414.

PALO VERDE VALLEY (BLYTHE) PROJECT.

This valley is located in southern California in Imperial and Riverside Counties, on the west side of the Colorado River. It is about 25 miles long with an average width of 6 miles, and is well adapted to irrigation development. The Palo Verde Mutual Water Co. diverts water for about 35,000 acres from the Colorado River, which is the source of supply, at what is known as the Blythe heading. Additional lands may be irrigated if proper diversion is provided with storage in the Colorado River above. River protection is also required.

References: Development of Unused Lands, H. Doc. No. 262, 66th Cong., 1st sess. Also Preliminary Report on Problems of the Imperial Valley and Vicinity, January, 1921, House of Representatives Committee Print, 66th Cong., 3d sess.

PIT RIVER BASIN.

Investigations were made in cooperation with the State of California in 1914 and 1915 under agreement dated May 27, 1914, of the area included in Pit River drainage basin in northern California to determine the feasibility of constructing reservoirs and other works necessary or desirable for the full utilization of the waters of Pit River and its tributaries. In 1903–4 the Reclamation Service made a reconnaissance of the Pit River Basin and located and surveyed five reservoir sites, viz, Jess, West, Warm Springs, Round, and Big Valleys; in 1914 a new reservoir of large storage capacity and supply was located in Fall River Valley. The principal work of this investigation consisted in reviewing, rearranging, and classifying older studies, bringing them up to date and in harmony with a comprehensive treatment of the resources of the entire basin. The conclusions from the investigations are to be found on page 513 of the 15th annual report. Document No. 81, 1st session 62d Congress, published June 29, 1911, considers the feasibility of storage at Big Valley for the controlling of floods in the Sacramento Valley. A published report issued by the Reclamation Service in 1915, was reprinted by the California State Printing Office. Report of the Conservation Commission of the State of California in 1912 published data gathered by the Department of Agriculture as to the extent of irrigation development in the Pit River Basin showing areas irrigated, types of crops grown, etc.

References: 14th annual report, page 64; 15th annual report, page 512. In earlier reports reference is made under Sacramento Valley projects.

SAN DIEGO RIVER.

Located in southern California, in San Diego County, investigation was made by John S. Longwell under the terms of the contract with the Volcan Land & Water Co., dated July 12, 1919, which included a study of the following features:

(*a*) Water supply developed and possible development by the present system of the Cuyamaca Water Co.

(*b*) Water supply that may be developed by a proposed system of the Cuyamaca Water Co.

(*c*) Conditions throughout the underground reservoirs along the San Diego River between Cape Horn point and San Diego.

(*d*) Water supply that may be developed at El Capitan Reservoir by the city of San Diego.

The results of the studies by Mr. Longwell are subject to change when more complete data are available, but it may be stated that the San Diego River presents opportunity for only limited water supply development, and that owing to the scarcity of water in San Diego County every effort should be made to conserve as much as possible of the available supply for domestic purposes and for irrigation of lands.

Reference: 19th annual report, page 415.

SAN JOAQUIN INVESTIGATIONS.

An investigation was made in 1905 of ground-water conditions in the San Joaquin Valley to determine the areas where underground waters occur in quantities sufficient to justify development.

References: 4th annual report, page 96; 5th annual report, page 99.

SHASTA VALLEY.

The landowners in the Shasta Valley, Siskiyou County, in northern California, representing approximately 300,000 acres, are considering the matter of forming an irrigation district under the State laws with a view of irrigating their lands from the Klamath River. In 1905 reconnaissance was made by this Service in Klamath River drainage basin, which considered the possibilities of irrigation in Shasta Valley by diversion from Klamath River.

References: 2d annual report, pages 110–111; 4th annual report, pages 108–109.

STONY GORGE EXTENSION OF ORLAND PROJECT.

The proposed extension of Orland project in Glenn County, in northern California, embraces a gross area of 30,000 acres bordering the present project on the west and south and all lying south of Stony Creek, on the line of the Southern Pacific Railway. Stony Gorge dam site is located about 1 mile south of the village of Elk Creek on Stony Creek. The reservoir site has a capacity of 104,700 acre-feet. It is proposed to divert the stored water at the South Diversion Dam of the Orland project and to carry it through the South Diversion Canal and several of the laterals of the present project.

Investigations were made in 1918 and report on the water supply was made by J. S. Longwell February 18, 1919; diamond drilling for testing foundations at Stony Gorge was begun September 12 and completed November 23, 1918.

Reference: 18th annual report, page 386.

TURLOCK-MODESTO PROJECT.

This project is located near the center of the State in Stanislaus, Merced, and Tuolumne Counties. The Turlock and Modesto Irrigation Districts have a common source of water supply and a jointly owned diversion dam, and both are interested in an increased water supply by storage. The source of water supply is the Tuolumne River. The present regulating and storage reservoir, known as the Owen Reservoir, in the Turlock District, is located in a foothill basin, and has a capacity of 48,000 acre-feet. The Modesto District has a storage and regulating reservoir in the low foothills known as the Dalls-Warner Reservoir, with a capacity of 28,000 acre-feet. The Don Pedro dam site is located in the Tuolumne River Canyon, about 3 miles above the existing La Grange Diversion Dam, and has a capacity of 260,000 acre-feet. The irrigation plan involves the construction of a storage reservoir on the Tuolumne River to be used jointly by the two irrigation districts and the construction of canals and laterals for the irrigation of additional lands outside the districts.

Reference: Doc. No. 262, 66th Cong. 1st. Sess., Development of Unused Lands, 1919.

WARNER RESERVOIR PROJECT.

This project is located in southern California, in San Diego County, and was investigated under a contract dated July 12, 1919, with the Volcan Land & Water Co., of San Diego, by John S. Longwell, of the Reclamation Service. It was not possible to carry out all of the investigations originally planned, but the report dated February 28, 1920, covers the following features:

(*a*) San Luis Rey Irrigation District development: General outline and discussion.

(*b*) Warner-Escondido irrigation development: (1) General investigation; (2) water-supply studies; (3) discussion of construction features.

(*c*) Linda-Vista irrigation development and municipal supply development for city of San Diego; (1) water-supply studies; (2) discussion of construction features.

Reference: 19th annual report, page 414.

OTHER PROJECTS.

Reports have been received from the project manager of the Orland project upon supplying additional reservoir facilities and the possible extension of the following irrigation districts and other constructed or partially constructed projects in California: San Ysidro, San Luis Rey, Woodbridge, Wheatland, Browns Valley, Surprise Valley, Happy Valley, and the Excelsior Mining & Water Co.'s irrigation system; also on the possible development of the Yuba River water-

shed, including the Oregon House, Virginia Ranch, Tennessee Creek, and Homcut reservoir sites. These investigations are purely preliminary, being based upon a hasty field inspection and an examination of data accumulated from various sources.

Reference: 18th annual report, page 386.

COLORADO.

DOLORES PROJECT.

Located in southwestern Colorado, in Montezuma and Dolores Counties, this project contemplates the diversion of water from the Dolores River for the irrigation of mesa lands on the San Juan River slope to the west of the town of Dolores and extending to or possibly beyond the Colorado-Utah State line. Necessary storage would be provided by the construction of a dam about 10 miles below the town of Dolores. With a dam 230 feet high, 258,000 acre-feet will be impounded, but as the diversion into the main carriage canal will not be more than 47 feet below the top of the dam the available irrigation capacity of the reservoir will not exceed 120,000 acre-feet. A study of the water supply shows that after providing for prior appropriations water is available for only about 50,000 acres. The Dolores Irrigation Co. was organized in 1911 for the purpose of building an irrigation system to supply the territory embraced in this project. This company found itself unable to secure the necessary funds for construction and abandoned the scheme. A reconnaissance of the irrigable areas and possible dam sites in the Dolores Basin was made by the Reclamation Service in 1915 and 1916 in connection with the Colorado River investigations.

References: 16th annual report, page 351; 18th annual report, page 387.

GRAND VALLEY PROJECT PUMPING EXTENSIONS.

Located in western central Colorado, in Mesa County, the proposed extensions to the Grand Valley project include five distinct areas lying above the project main canal between Palisade and Mack, Colo. It was not feasible to locate the project main canal high enough to cover these lands by gravity and a power plant on the project main canal is necessary to lift the water from the gravity canal to supply the different pumping areas. Approximately 10,000 to 12,000 acres of irrigable land can be reached with a lift not exceeding 150 feet. No storage is contemplated in connection with this extension. It is proposed to locate the power plant on the south bank of the Grand River adjacent to the present Orchard Mesa pumping plant where the head available is 75 feet, which will develop 3,400 theoretical horsepower.

Reference: H. Doc. No. 262, 66th Cong., 1st sess., Development of Unused Lands, 1919.

LITTLE SNAKE RIVER PROJECT.

Located in Moffat and Routt Counties, in northwestern Colorado, and Carbon County, in southern Wyoming, the project proposes the diversion of water from Slater Fork and the upper Little Snake River to irrigate lands along Beaver, Four Mile, and Timber Lake Creeks

and the benches lying between these streams. Most of the project is public land withdrawn under the Carey Act. The irrigable area as considered by the Reclamation Service is 50,000 acres. A number of reservoir sites have been located by various Carey Act companies. The two sites best adapted for the use of this project are the Columbus Mountain, with a possible storage capacity of 73,000 acre-feet, and the Slater, which would cover an area of over 2 square miles, both on Slater Creek. Investigations of this project were begun in the summer of 1918 by the Reclamation Service, but on the representation of the Elk River Irrigation & Construction Co., that it had entered into a contract with the State Land Board of Colorado and the Great Northern Irrigation & Power Co. to construct irrigation works for the land embraced within the proposed Little Snake River project and that it had actually begun construction of its main canal and the verification of these statements by the State Land Board, the investigation of this project was abandoned.

Reference: 18th annual report, page 389.

MONTEZUMA PROJECT.

Located in southwestern Colorado, in Montezuma County, this project covers some 50,000 acres of irrigable land most of which is included in the Montezuma Irrigation District, organized in 1901 under the laws of Colorado. About 25,000 acres have been irrigated more or less successfully, the water supply usually being deficient after the middle of July. Water is diverted from the Dolores River through a tunnel 5,800 feet in length into the San Juan Basin. The district irrigation works are in poor condition and need extensive repairs and replacements. Storage is required. The Narraguinep Reservoir has been constructed with a capacity of about 6,000 acre-feet, which may be increased to 10,000 acre-feet. The Ground Hog Reservoir has been only partially constructed, but with an 80-foot dam it would store about 7,000 acre-feet. The Totan Lake Reservoir, with an 80-foot dam, will impound 10,000 acre-feet. The only other available storage for this project appear to be the Dunton and Johnny Bull sites, located on the headwaters of the West Dolores River, with a maximum storage of 35,000, giving a total of 62,000 acre-feet maximum for the project, which would be adequate for about 35,000 acres.

References: 18th annual report, page 387; H. Doc. No. 262, 66th Cong., 1st sess., Development of Unused Lands, 1919.

ORCHARD MESA PROJECT.

Located in western-central Colorado, in Mesa County, the Orchard Mesa project embraces about 10,000 acres of land situated on an elevated bench on the south side of the Grand River between Palisade and Grand Junction, Colo. In 1904 the Orchard Mesa Irrigation District was organized under the laws of Colorado and the project constructed in 1909 and 1910. The annual assessments levied on the lands were greater than the landowners could pay, and at the request of both the bondholders and landowners the Reclamation Service has made a number of examinations of the project with the view of including this district within the Grand Valley project. Two lifts are now required to serve the lands, one of 125 feet and one of 40 feet.

No storage is contemplated. A plan has been approved (March 19, 1921) by the Secretary whereby the department will recommend that Congress authorize it to undertake the reconstruction of this project, contingent upon the following conditions:

1. That the water users' association agree to the free use of existing necessary works now charged to the Government project without any charge to the Orchard Mesa District.
2. That at least 10,000 acres of the lands that can be watered by the Orchard Mesa system be effectively pledged to the repayment of the cost.
3. That the outstanding indebtedness be settled at a total cost not exceeding $100,000.
4. That the above conditions be met not later than August 1, 1921.

References: 16th annual report, page 81; 18th annual report, page 388; H. Doc. No. 262, 66th Cong., 1st sess., Development of Unused Lands, 1919.

SAN LUIS VALLEY PROJECT.

This valley is in south-central Colorado near the State line. It extends from north to south about 150 miles and from east to west about 50 miles in its greatest width. Work in the valley was first taken up by James A. French, engineer, under instructions of May 23, 1910. The principal purpose of the earlier investigations was to determine or obtain data from which an estimate might be made of the present and probable future irrigation in the valley as affecting the water supply of the Rio Grande and the Rio Grande project. Investigations were continued by Mr. French until July 1, 1912, when the work was taken up by J. D. Stannard, engineer, who in cooperation with D. G. Miller, drainage engineer of the Department of Argiculture, prepared a report on certain well-defined points. (See 15th annual report, p. 520.) During the fiscal year 1919 Harold Conkling, engineer, made a field reconnaissance and review of all the data collected to determine if there is sufficient water supply in the San Luis Valley to justify extensive development there and if the construction of a comprehensive drainage system would provide additional water for the irrigation of new lands farther down the river. A large area is badly in need of drainage, but if these lands were drained their irrigation would exhaust the entire flow of the rivers furnishing the valley's water supply. The total discharge of these streams is already overappropriated and if additional land is to be irrigated in the valley the water supply must come from pumping ground water or return from drainage systems. Drainage will not develop increased water at the valley outlet, because water so developed might be reused in the valley. In fact, it is believed that drainage will cause a reduction in the outflow, because the increased demand for irrigation will exceed the present loss from evaporation. The existing irrigation system, with possible enlargements, can distribute all the water obtainable, so that the ultimate irrigation development does not call for construction of large distribution systems, nor does it appear that the construction of a drain through the trough of the valley would be warranted, except at the expense of the owners of the land to be benefited by such drainage work.

References: 15th annual report, page 520; 18th annual report, page 389; H. Doc. No. 262, 66th Cong., 1st sess., Development of Unused Lands, 1919.

STERLING PROJECT.

Investigations were made of this project, which is located in northeastern Colorado, in 1902 and 1905. It was proposed to divert the flood waters of the South Platte River, using reservoirs on the plains for the irrigation of lands of the valley on the north side of the river. Several reservoir sites were considered, particularly one known as the Pawnee Pass Reservoir. After full consideration of the water supply available it was found to be inadequate and further surveys and investigations were abandoned.

References: 1st annual report, pages 154–160; 2d annual report, pages 162–182.

WHITE RIVER PROJECT.

Located in northwestern Colorado, the project as outlined contemplated the diversion of water from the North Fork of White River and the utilization of the lakes at the heads of the various tributaries of North Fork to augment the low-water stages for the purpose of irrigating lands on Little Beaver Creek, about 10 miles east of Meeker, and, if possible, to convey water through the divide between White and Yampa Rivers to irrigate lands in Axial Basin. As practicability of the project from a financial standpoint appeared to be doubtful, no investigations were made after 1904.

References: 2d annual report, pages 201–206; 3d annual report, page 228.

IDAHO.

BIG BRUNEAU PROJECT.

This proposed project is located in southwestern Idaho, in Twin Falls and Owyhee Counties, and includes an area of about 420,000 acres of irrigable land which can be irrigated from the proposed storage reservoir at American Falls or other sites on the Snake River. A canal 80 miles in length is necessary to convey the water to the head of the lands, after diversion at the Milner Dam. A small amount of reconnaissance work only has been done by the Reclamation Service, but a number of engineering reports have been made by private interests in connection with Carey Act projects. To determine the feasibility of this project a large amount of preliminary work will be required.

Reference: 17th annual report, page 383.

BOISE PROJECT EXTENSION (BLACK CANYON DIVISION).

This project includes a total area of 53,000 acres, 39,000 acres of which cover the most desirable portions of the Black Canyon Irrigation District. The public land in Black Canyon district is now withdrawn from entry. There is under construction the Notus Canal to serve a small part of this area with Boise River water. The bulk of the district may be reached from the Payette in cooperation with the Emmett Irrigation District. A tentative plan has been developed under which the United States would build the Black Canyon Dam in the Payette River and rebuild a portion of the main canal of the Emmett district, combining with this work the main canal to the Black Canyon district. Such an arrangement is proposed in a contract now under negotiation with the Emmett district.

Reference: 17th annual report, page 383.

BOISE PROJECT EXTENSION (HILLCREST DIVISION).

This proposed extension contains 14,000 irrigable acres lying above and to the southeast of the main south side canal of the Boise project. About 11,500 acres lie within the Boise-Mora Irrigation District and about 2,600 acres adjacent thereto lie in the Hillcrest Irrigation District. These lands may be reached by pumping water from the main canal of the Boise project with electric power from the Boise Federal power plant. The lift will be 80 feet to the main canal, which will have a capacity of 200 second-feet, with lateral system to the farm units. A form of contract covering the conditions upon which land embraced in the Hillcrest and Boise-Mora Irrigation Districts may be added to the Boise project was approved by the Secretary of the Interior on April 4, 1921.

Reference: 18th annual report, page 413.

DUBOIS PROJECT.

This project is located in the eastern-central part of the State and contemplates the irrigation of 200,000 to 250,000 acres of land southwest of Dubois and near Mud Lake. The source of supply is the North Fork of the Snake River and its tributaries, to be diverted near St. Anthony, Idaho. Storage will be necessary and practically every important branch of the North Fork would have to be utilized to furnish an adequate supply of water for the reclamation of lands under this project. About 20 reservoir sites have been surveyed, the most desirable of which are Henry Lake, Flat Rock, Island Park, Fall River Meadows, Mountain Ash, and Teton. Surveys and investigations were practically completed in 1904, and nothing has been done since beyond the gaging of streams.

References: 2d annual report, pages 279–295; 3d annual report, pages 257–259; 4th annual report, pages 151–160.

GEM DISTRICT PROJECT.

This project is located in southwestern Idaho in Owyhee County, and is included in an irrigation district organized under the laws of Idaho, which now operates a pumping plant and canal system. The area to be served is about 27,000 acres, covering the larger part of Sucker Creek Flat; a part of this area is now cultivated, the source of water supply being Snake River. Power is purchased from private companies under conditions unsatisfactory to the landowners, and it is proposed to construct a power plant at Arrowrock, with a transmission line about 50 miles long, to the present pumping plant of the Gem Irrigation District, which would be enlarged; the present canal and lateral system would require enlargement and improvement. This area has been considered in connection with the Owyhee project, Oregon.

See Development of Unused Lands, H. Doc. No. 262, 66th Cong., 1st sess.

HANSEN BUTTE PUMPING PROJECT.

This project is situated in Twin Falls County, south-central Idaho, on the south side of Snake River above the Twin Falls Canal, and extends from Milner to Rock Creek, 15 miles west. The irrigable land is mostly in private holdings and can be covered by pumping

from the Twin Falls Canal or from Snake River. Under a lift of 100 feet, there is an area of about 22,000 acres. A lift of 60 feet would reach 5,500 acres. The project has been under consideration for a number of years. At first it was proposed by a private company to develop power by a drop of 80 feet in the Twin Falls Canal, but the canal had no surplus carrying capacity, and although plans were made for its enlargement they were not carried out. The source of the water supply is Snake River, and storage would have to be provided either from Jackson Lake Reservoir or by development at Island Park or American Falls. Power for pumping would be developed either at the Minidoka power plant when enlarged or at the proposed Eagle Rock site, or power might be leased from the Idaho Power Co. In the future this project might be considered in connection with the Minidoka North Side Pumping Division.

MINIDOKA PROJECT EXTENSION, NORTH SIDE PUMPING DIVISION.

This division lies to the north and west of the Minidoka project, in Minidoka, Power, and Lincoln Counties, in southern Idaho. It contemplates the development of 115,000 acres of irrigable land, practically all of it being public land withdrawn from entry. The source of water supply is the Snake River, and storage will be required at American Falls, or some other site on the Snake River. A hydroelectric power plant will be necessary at some convenient point to generate power for the operation of pumping plants to raise the necessary water for irrigation from the Snake River near Lake Walcott, the maximum lift required being 120 feet. Preliminary surveys were made in 1908, 1912, and 1913. More detailed surveys were begun in 1918.

References: 18th annual report, page 413; 19th annual report, page 419.

MINIDOKA PROJECT, LAKE WALCOTT PUMPING DIVISION.

This proposed division lies along the south shore of Lake Walcott, in Cassia County, Idaho, the western edge being about a mile east of the Minidoka Dam. The plan calls for the pumping of water from Lake Walcott with a maximum lift of 30 feet above the lake for the irrigation of about 2,470 acres. Water supply is from Snake River, supplemented by storage to be obtained either at Jackson Lake, Island Park, or American Falls. Power required for pumping would be developed at the Minidoka Dam. The land is practically all public land withdrawn from entry.

MOUNTAIN HOME PROJECT.

This project is located in Ada and Elmore Counties, in southwestern Idaho, and contains a gross area of 700,000 acres, of which 420,000 acres are classed as irrigable. Although a partial water supply has been considered from the Boise, Salmon, and Payette Rivers, the entire area could be irrigated from the Snake River, if fully regulated by reservoirs at American Falls and other sites. A canal would divert on the north side of the Snake River at the Milner Dam; the length of the canal would be 112 miles to the head of the irrigable area, which has an unusually smooth and even surface, over which the water could readily be distributed. It is estimated that there

is only sufficient water supply in the Snake River to irrigate 620,000 to 700,000 acres of new land, and the proposed extension of the Minidoka project will take over 100,000 acres of this, so that it is possible to reclaim little more than the proposed Mountain Home project, or some other equal area. Preliminary levels of the canal line have been run, but no estimates made. A contract has recently been entered into with the Boise Chamber of Commerce for making additional surveys and investigations of this project.

References: 17th annual report, page 383; 18th annual report, page 415.

PORT NEUF PROJECT.

This project is located in the southeastern part of Idaho; a preliminary investigation was made in 1908 of the irrigation possibilities in the valley of Port Neuf River. The proposed plan consists in the storage of the flood waters of Blackfoot River in a reservoir to be constructed at Blackfoot Marsh; the delivery of stored water to the channel of Blackfoot River, and its diversion 15 miles below the reservoir into a canal discharging into Port Neuf River; and two diversions from Port Neuf River, supplying water, respectively, to about 25,000 acres of land between Chesterfield and Bancroft, in Bannock County, and to about 40,000 acres between Pocatello and American Falls, in Bannock and Oneida Counties. No additional investigations have been made since 1908. See 8th annual report, page 82.

References are made in early Reclamation Service reports on Bear Lake project, Utah, of the possible diversion of Bear River to Port Neuf River.

SHELLEY-SHOSHONE PROJECT.

This project, located in southeastern Idaho, involves the diversion of water from the north side of the Snake River about 3 miles north of Shelley, Idaho, to serve about 56,000 acres between Shelley and American Falls and about 133,000 acres between Minidoka and Kimama, including the lands of the Minidoka North Side Pumping division; also crossing Snake River to Rock Creek to serve about 36,000 acres in the Raft River Valley, and 97,000 acres south and west of the Minidoka project, including the Kenyon and Hansen Butte tracts, and eliminating all necessity for irrigation pumping on the Minidoka project. At a point in the canal west of American Falls a drop for the development of power is contemplated, returning the water into the proposed reservoir at American Falls. The construction of this project is regarded as very expensive. A board of engineers reporting on the American Falls Reservoir project stated that the Shelley Canal project might be feasible as an irrigation enterprise for watering lands between Shelley and American Falls, although information was not sufficient to form a basis for conclusion. For the irrigation of lands in proposed Minidoka Pumping project and lands to the westward thereof the Shelley Canal was not considered feasible, and also the canal was not regarded as a practicable source of power for substitution at American Falls.

References: 18th annual report, page 413; 19th annual report, page 418.

SNAKE RIVER BASIN INVESTIGATIONS, AMERICAN FALLS RESERVOIR.

This site is located in southeastern Idaho near the town of American Falls and the crossing of the Oregon Short Line Railroad over the Snake River. A 90-foot dam would impound 3,000,000 acre-feet and make available for irrigation the entire water resources of the Snake River. The estimated capacity to which the reservoir should be built varies from 1,500,000 to 3,000,000 acre-feet, depending upon whether future development of new lands takes place above or below American Falls. The geological conditions of the dam and reservoir site are considered favorable for the development. The Reclamation Service has submitted to the storage committee appointed by the water users, both above and below American Falls, estimates of costs of various sized reservoirs and a form of contract providing for the construction of the reservoir by the Reclamation Service, with funds to be advanced by the various organizations desiring storage, together with such funds as may be appropriated by Congress for this purpose. During the fiscal year investigations have been continued, including topographic surveys, classification and appraisal of land in the reservoir site, and drilling at the dam site. Negotiations for rights of way are in progress and a considerable portion of the necessary land has already been purchased.

References: 18th annual report, page 414; 19th annual report, page 417.

MONTANA.

BITTERROOT VALLEY PROJECT.

This project is located in western Montana, in Missoula and Ravalli Counties. It is a narrow valley about 60 miles long with an average width of 8 miles. The project was built about 1910 by private enterprise and was originally intended to cover about 35,000 acres. The maximum area irrigated in any one year to date is reported as 19,600 acres. The irrigation plant needs rebuilding to a large extent, but before beginning this a more thorough and complete study of the system and its available water supply is essential. The water supply is furnished mainly by Rock Creek, a tributary of the Bitterroot River, with the aid of 32,000 acre-feet of storage in Lake Como. An adequate water supply appears to be available for all the lands practicable to include in this project, because of limited canal capacity and impracticability of extension or enlargement. An irrigation district has been formed embracing part of the lands of this project under the name of the Bitterroot Irrigation District. The area of the land included is 18,000 acres.

References: 3d annual report, page 313; 17th annual report, page 383; 19th annual report, page 419.

CLARK FORK PROJECT.

This project, located near the Montana-Wyoming boundary line, contemplates the irrigation of lands in southern Montana in Carbon and Stillwater Counties. A preliminary survey was made in 1905, but the plan then considered was found to be too expensive. In 1919 further investigations were made, of a reconnaissance nature, at the instance of the Chamber of Commerce of Red Lodge, Mont., and the farmers and business men of the valley. During the fiscal

year work consisted of a general examination of the project areas and storage sites and a study of the water supply. Preliminary surveys were made of the various canal lines. It is proposed to divert the unappropriated waters of East and West Rosebud Creeks, supplemented by storage, into Red Lodge and Rock Creeks for use on lands along these streams, and in turn to divert their flow, supplemented by storage in lakes at their upper ends, easterly to supply lands below Grove Creek. Lands above Grove Creek may be supplied from Little Rocky Creek and Bennett Creek, also by enlargement of the Nills Canal, diverting from Clark Fork to lands on the east side of the valley.

References: 4th annual report, page 224; 5th annual report, page 164; 6th annual report, page 130; and 19th annual report, page 422.

CROW RESERVATION INDIAN PROJECT.

This project is located in southern Montana, in Bighorn and Yellowstone Counties. The lands are mostly in the ceded strip of the Crow Indian Reservation, which was opened to settlement July 16, 1906. The project as described in the fifth and other early reports of the Reclamation Service comprised three divisions—the Fort Custer, Waco-Sanders, and Bighorn—and involved the development of a large acreage of irrigated lands, a considerable portion of which has since been developed by the Indian Service and private companies.

References: 3d annual report, pages 83, 326; 4th annual report, pages 209, 225; 5th annual report, page 172; 6th annual report, page 130; 7th annual report, page 99.

CUT BANK PROJECT.

This project involves the irrigation, by diversion from Cut Bank Creek, of 11,000 acres of land in the vicinity of Cut Bank, Mont., together with 9,000 acres included within the boundaries of the Blackfeet Indian Reservation. Storage would be required in order to provide a supply for the entire 20,000 acres; little information is available regarding possible storage sites. A contract was entered into under date of June 13, 1921, with the Cut Bank Irrigation District for financing an investigation, and water-supply studies are now being carried on by the project manager at Browning, Mont.

FLAT WILLOW PROJECT.

This project is located in Fergus County, in central Montana, and its development was undertaken a number of years ago as a Carey Act project by the Fergus Land & Irrigation Co. At the request of the landowners, Engineer R. H. Fifield examined this project in the summer of 1918, making a study of all previous reports and available data in reference to it. The source of water supply is Flat Willow Creek and the proposed plan contemplates the construction of storage works to store the flood waters to reclaim about 15,000 acres of irrigable land. Further investigations are necessary to determine the amount of water available and the demands upon the stream flow to provide for prior irrigation and riparian rights from Flat Willow Creek.

Reference: 18th annual report, page 415.

FORT KEOGH PROJECT.

A reconnaissance was made in 1907 and 1908 by Engineer E. C. Bebb to determine the possibility of irrigating the Fort Keogh Indian Reservation lands. This investigation indicated that the project might be feasible for a development of about 6,000 acres, but no further investigations were made by the Reclamation Service.

HELENA-PRICKLY PEAR PROJECT.

This project was originally planned by the Missouri River Power Co. and provided for pumping from Hauser Lake into three canals on the north side of the Prickly Pear Valley and one on the south side. The total irrigable area was estimated at 20,800 acres, the greater part being in private ownership. Water-supply and storage sites for the irrigation of additional lands by gravity were investigated by the Reclamation Service in 1909. This investigation indicated that more elaborate surveys and studies of run-off would be necessary in order to determine the feasibility of the project. This section of the project has been partly constructed by private interests. The investigation of the Reclamation Service also included the proposed development of lands in the vicinity of East Helena by diversion from Little Prickly Pear Creek.

JUDITH BASIN PROJECT.

This project is located in Fergus County, in central Montana. Under a contract dated August 20, 1919, with a committee for the landowners, the Reclamation Service made an investigation of the project. The work was done in the fall of 1919 under the direction of Engineer C. C. Fisher. The irrigable area of about 36,500 acres is practically all in private ownership and consists mainly of bench lands, which are nearly all under cultivation by dry farming. About 7,000 acres are bottom lands under irrigation from private ditches, which take all the low-water flow. The water supply is from the Judith River, and the plan proposed includes the construction of sufficient storage on that river to conserve the entire mean flow for irrigation. Six reservoir sites were investigated, one of which, the Pigeye Basin site, is recommended, with an earth dam 146 feet maximum height and having a capacity of 42,800 acre-feet. The lands to be irrigated are on either side of the Judith River and comprise the western portion of what is known locally as the Judith Basin. The South Judith Canal, with a total length of 21 miles, would supply about 14,500 acres, and the North Judith Canal, about 16 miles in length, would supply an equal amount.

Reference: 19th annual report, page 420.

KALISPELL (HELENA FLATS) PROJECT.

This proposed project is located in northwestern Montana, in Flathead County, and lies directly north of Kalispell. A reconnaissance was made by engineers of the Reclamation Service in 1920 under an agreement with the Kalispell Chamber of Commerce. There is an area of about 14,000 acres of irrigable land which may be watered from Flathead River or Whitefish River. The investigations made would not warrant definite conclusions but further studies are believed advisable.

Reference: 19th annual report, page 422.

LAKE BASIN PROJECT.

This proposed project is located in Sweetgrass, Stillwater, and Yellowstone Counties, in south-central Montana, and was investigated in the earlier years of the Service. It proposes the irrigation of large bodies of land lying north of the Yellowstone River between Billings and Livingston. In this area are several large tracts or basins of good land without natural drainage which could be supplied with water from the Yellowstone River, diverting near Livingston. Storage would be required. No recent investigations have been made.

References: 4th annual report, page 228; 5th annual report, page 159; 6th annual report, page 129.

MADISON RIVER PROJECT.

The proposed Madison River project is located in Jefferson and Broadwater Counties, in west-central Montana. It plans the irrigation on several tracts of land which lie along the Madison and Missouri Rivers comprising 150,000 to 175,000 acres. It is proposed to divert from the Madison River near the mouth of Cottonwood Canyon and store the flood waters in the canyon above. The construction costs would be high, as water-power companies have appropriated much of the water and the largest of the reservoir sites. No recent investigations have been made.

References: 4th annual report, page 228; 5th annual report, page 167; 6th annual report, page 130.

MARIAS PROJECT.

This project is located in Chouteau and Hill Counties, in north-central Montana. In earlier reports its development was considered in connection with the Milk River project, but later as a separate secondary project. Under the proposed plan there are some 200,000 acres of irrigable land to receive water from the Marias River with storage to be provided on Two Medicine River and in Sandstone Canyon on the Marias River; also a natural depression known as Lonesome Lake. There are a number of unusually difficult engineering features connected with the construction of the project. No work has been done of late years.

References: 3d annual report, pages 80, 292, 306; 4th annual report, page 178; 6th annual report, page 119; 7th annual report, page 111.

MISSOULA-HUSON PROJECT.

This project is located in west-central Montana, in Missoula County, and extends from 5 miles below Missoula to the town of Huson, covering the bottom lands on the northeast side of the Missoula River, from which diversion is made. The lands are partly served by the Grass Valley ditch, which, as constructed, extends about one-half the length of the valley. An investigation made in 1919 indicates that it is practicable to develop a project of about 8,000 acres by enlarging and extending the Grass Valley ditch between Missoula and Huson and that no difficult engineering features or heavy construction will be encountered. The water supply is abundant for even the dryest years without storage. The Grass Valley ditch occupies the only

location by which the valley can be irrigated from the Missoula River by gravity. All of the land is in private ownership.

References: 18th annual report, page 415; 19th annual report, page 421.

MUSSELSHELL RIVER RECONNAISSANCE.

A reconnaissance was made in 1902 and 1903 to determine the feasibility of diverting the flood waters of the Musselshell River to storage reservoirs in the watershed of Big Dry Creek for the purpose of irrigating various tracts east of Folsom, Mont.

References: 1st annual report, page 215; 2d annual report, page 352.

SHONKIN PROJECT.

This project consists of some 300,000 acres of land, gross area, south of the Missouri River, the greater part of which lies immediately east of Great Falls, Mont. It is proposed to divert from the Missouri River at Half-breed Rapids, about 25 miles southwest of Great Falls, with storage of flood waters from Smith River, Belt, Highwood, and Shonkin Creeks. A brief investigation was made in 1909 from which it was concluded that further investigations were advisable.

TALLY LAKE PROJECT.

This project is located in Flathead County, in northwestern Montana. The area which may be covered consists of about 12,000 acres on the west side of Stillwater River and between the Stillwater River and Whitefish River just north of Kalispell. The water supply comes from the south branch of the Stillwater. Tally Lake is the only reservoir proposed. From investigations of the project made by the Reclamation Service in 1920 for the owners of the land and at their expense, the following conclusions have been reached:

(*a*) A feasible irrigation project of about 12,000 acres exists.
(*b*) Transportation and marketing conditions are good.
(*c*) The soil is good.
(*d*) The water supply is ample, with storage.
(*e*) The climate is favorable.
(*f*) The topography of the land, while somewhat rough, will permit successful irrigation.
(*g*) The estimated cost of development is comparatively low.

Reference: 19th annual report, page 421.

THREE FORKS PROJECT.

This project contemplates the development of about 10,000 acres of the North Bench, immediately north of Three Forks, Mont., and about 20,000 acres of the South Bench, lying south of Three Forks and between the Madison River and Willow Creek. The North Bench Division might be watered by gravity from either Boulder River or Jefferson River, but it is believed that the cost per acre would be prohibitive. The South Bench, however, might be irrigated from either Willow Creek or Madison River and is considered worthy of further investigation as soon as funds are available. Preliminary investigations were made by the project manager, St. Ignatius, Mont., in 1918.

TOSTON (TOWNSEND BENCH) PROJECT.

This project consists of about 15,000 acres of excellent land in the vicinity of Toston, to be watered by a gravity system diverting from the Missouri River at a point about 6 miles above Toston. A preliminary investigation was made in 1918 by the project manager, St. Ignatius, Mont., who recommended that an appropriation be made to cover further investigations.

NEBRASKA.

LOWER PLATTE INVESTIGATIONS (FARMERS DITCH AND CANAL COMPANY DIVISION).

This project is located in western Nebraska, in Lincoln and Dawson Counties. There are about 50,000 acres of irrigable land on the south side of the Platte River on a gently sloping bench. The source of water supply is the Platte River, and supplemental storage, with diversion about 6 miles below the town of North Platte for the joint benefit of this project and the Lincoln and Dawson County Canal across the Platte River. Negotiations are now pending with the Lower Platte Irrigation Association for financing an investigation of irrigable areas and water supply along the lower Platte River.

Reference: 18th annual report, page 416.

LOWER PLATTE INVESTIGATIONS (LINCOLN AND DAWSON COUNTY CANAL).

Located in western Nebraska, in Lincoln and Dawson Counties, there is an irrigable area of about 45,000 acres of fertile land lying on the north side of the Platte River, practically all of which is in private ownership. The water supply is from the North Platte River, and a possible reservoir site near Lincoln and Dawson County line in what is known as Wild Horse Valley. The irrigation plan contemplates diversion from the Platte River, about 6 miles east of the city of North Platte, by means of a low diversion weir to be used jointly with the Farmers Ditch and Canal Co. Division on the south side of the river. Negotiations are now pending with the Lower Platte Irrigation Association for financing an investigation of irrigable areas and water supply along the lower Platte River.

References: 18th annual report, page 416.

NIOBRARA AND SNAKE RIVERS RECONNAISSANCE.

An examination of these streams was made to determine the water supply and to locate irrigable areas, but no feasible irrigation project was discovered.

Reference: 3d annual report, page 338.

TRI-COUNTY PROJECT.

This project contemplates the irrigation of about 140,000 acres of land, all in private ownership, in Gosper, Phelps, and Kearney Counties, by direct diversion from the Platte River. An investigation was made in 1914 from which it was concluded, under condi-

tions then existing, that the project without storage was infeasible on account of insufficient water supply.

Reference: 14th annual report, page 170.

NEVADA.

HUMBOLDT RIVER PROJECT.

The Humboldt River Basin is located in northern Nevada in Elko, Eureka, Lander, and Pershing Counties. An investigation of the feasibility of irrigating additional lands in Humboldt Basin was made in 1919, in cooperation with the State of Nevada. The investigations as completed cover a study of the following features, based on the determination of existing rights: The construction of reservoirs on the North and South Forks, the building of a drainage system to supplement the water supply, and the establishment of modern irrigation methods, all in the Upper Humboldt Valley; and the construction of a reservoir on the Humboldt River, near Oreana, for use on the Lovelocks area.

References: 1st annual report, page 258; 4th annual report, page 267; 19th annual report, page 423.

NEWLANDS PROJECT (PYRAMID LAKE EXTENSION).

In western Nevada, in Washoe County, there are about 19,000 acres of irrigable land, most of which is public land and part of which is allotted Indian lands, which can be irrigated by a branch from the main canal of the Newlands project provided adequate storage is furnished. The construction of this extension can not be undertaken until the legal rights as to the waters of Lake Tahoe have been adjudicated or necessary storage secured elsewhere.

References: 3d annual report, page 351; 18th annual report, page 417; Development of Unused Lands, H. Doc. No. 262, 66th Cong., 1st sess.

UPPER CARSON PROJECT.

In Douglas County, western Nevada, are 39,000 acres of irrigable land which may be irrigated from the East and West Forks of the Carson River. Storage will be required and may be developed by the construction of the Horseshoe Bend Dam, on the East Fork, with a capacity of 50,500 acre-feet, supplemented by 2,400 acre-feet in the Alpine Reservoir on the headwaters of East Fork, and 3,700 acre-feet in the Dressler Reservoir on the West Fork. About 17,000 acres of the land are now under cultivation, but owing to shortage of the water supply in the latter part of the season storage must be supplied. About 10 per cent of the lands are public lands; the rest are private lands.

References: 2d annual report, page 355; 18th annual report, page 417; Development of Unused Lands, H. Doc. No. 262, 66th Cong., 1st sess.

WALKER RIVER PROJECT.

East and West Walker Rivers have their source in eastern California along the slope of the Sierra Nevada. Flowing in a general

northerly direction, they unite, forming Walker River which empties into Walker Lake, where its waters are lost by evaporation. Investigations were made during the earlier activities of the Service and again in 1915. A system of reservoirs and canals is proposed to irrigate a total of 109,700 acres in the three lower valleys, of which not over 28,000 acres have actually been irrigated. The works proposed are:

1. Storage reservoir in Antelope Valley, 200,000 acre-feet capacity.
2. Two main canals in Smith Valley, one on either side, with distributing system to cover 34,000 acres, of which 5,680 acres have been irrigated.
3. Two main canals in Mason Valley, one on either side, with distributing system to cover 65,000 acres, of which 20,760 acres have been irrigated.
4. A reservoir of 10,000 acre-feet capacity, to supplement the supply for Walker Lake Valley, to furnish water for 6,000 acres under canal, of which about 900 acres have been irrigated; also at some later date the improvement of a constructed canal on west side of the valley to cover ultimately 10,700 acres.
5. A storage reservoir at Big Meadows, on East Walker River, of 45,000 acre-feet capacity.

References: 1st annual report, page 266; 4th annual report, page 266; 5th annual report, page 207; 15th annual report, page 525.

NEW MEXICO.

CARLSBAD EXTENSION, PECOS RIVER INVESTIGATIONS.

A contract was entered into between the United States and the Pecos Valley Water Users' Association, September 22, 1920, for financing an investigation and surveys to determine the cost and feasibility of impounding flood waters for the irrigation of 20,000 acres of new land in the Pecos Valley near Carlsbad, N. Mex., and supplying storage for the Fort Sumner Irrigation District. A field examination was made by Engineer E. B. Debler, data were assembled, and report on water supply was submitted by him May 28,1921. A party is now in the field making a survey of the Alamo Gordo Reservoir site.

LA PLATA VALLEY PROJECT.

This project is located in northwestern New Mexico, in San Juan County, on the north side of the San Juan River, most of the land lying along the La Plata River. It proposes the diversion of the Animas River above the town of Durango, Colo., with storage on that stream and the headwaters of the La Plata River, for the irrigation of about 41,000 acres. The plan was found to be impracticable and no work has been done on the project since 1905.

References: 3d annual report, page 392; 4th annual report, page 280.

LAS VEGAS PROJECT.

This project is located in northeastern New Mexico, in San Miguel County. It is proposed to divert the flood waters of Sapello, Gallinas, San Guijuela, and Arroyo Pecos Creeks into a reservoir located about 4 miles north of Las Vegas to be used on about 10,000 acres of land

lying southeast of Las Vegas. Preliminary surveys and investigations were made in 1903; no work has been done since.

References: 3d annual report, page 369; 4th annual report, page 280.

MIDDLE RIO GRANDE PROJECT.

This project is located in Sandoval, Bernalillo, Valencia, and Socorro Counties, central New Mexico, and has a gross area of 134,000 acres in the Valley of the Rio Grande between White Rock Canyon on the north and San Marcial on the south, the reclamation of which requires both drainage and irrigation. About 49,000 acres are now under irrigation, of which approximately 9,000 are suffering from lack of drainage and large areas of uncultivated lands are now waterlogged. To supply water for irrigation it is proposed to construct a diversion dam at or near the mouth of White Rock Canyon, from which canals will be constructed on either side of the river above the lands to be irrigated. The project has been investigated in a cooperative way by the State of New Mexico and the Reclamation Service under the terms of a contract made January 2, 1920. During the fiscal year work was carried on by the State and consisted of underground water investigations and study of inflow from principal tributaries.

References: Development of Unused Lands, H. Doc. No. 262, 66th Cong., 1st sess., page 23; 18th annual report, page 417; 19th annual report, page 424.

PENASCO PROJECT.

A reconnaissance was made of the Penasco River, a tributary of the Pecos, and several reservoir sites surveyed, but the conditions were such that further investigation was not believed advisable.

Reference: 2d annual report, page 389.

SAN JUAN PROJECT.

This proposed project is located in northwestern New Mexico, in San Juan County, and contemplates the construction of a reservoir on the San Juan River, or one of its tributaries, for the irrigation of land lying south of the river and principally in the Navajo Indian Reservation. Only a preliminary reconnaissance has been made and there are not sufficient data on hand to determine the feasibility of the project. The largest reservoir examined is the Turley, located on the San Juan River, the proposed dam being about 8 miles below the mouth of Los Pinos River. It has a capacity of about 1,000,000 acre-feet. The irrigable area is estimated from 125,000 acres to double that amount, and is rolling and somewhat broken, being cut by numerous ridges and arroyos.

References: Development of Unused Lands, H. Doc. No. 262, 66th Cong., 1st sess., page 23; 2d annual report, page 393; 15th annual report, page 518.

URTON LAKE PROJECT.

This project is on the Pecos River, in eastern New Mexico, about 60 miles north of Roswell. It is proposed to divert the waters of the Pecos River by means of a dam and a canal about 35 miles long

into a natural basin or reservoir known as Urton Lake that has a capacity of 189,000 acre-feet, which may be increased to 250,000 or 300,000 acre-feet. Probably about 60,000 acres of excellent public land south of the reservoir and east of the Pecos River could be irrigated. Surveys and investigations were made in 1903. No work has been done since.

References: 2d annual report, page 387; 3d annual report, page 368.

NORTH DAKOTA.

BISMARCK PROJECT.

This project is located near the center of the State, near Bismarck, and was included in a group of proposed pumping projects located along the Missouri River, an essential factor being the use of lignite coal beds, which underlie large portions of the lands in this vicinity, for power purposes. The acreage to be reclaimed depends on the heights to which it is feasible to pump the water. Investigations were made in 1903 and 1904, but no recent work has been done.

References: 3d annual report, page 442; 4th annual report, page 287; 6th annual report, page 173.

LITTLE MISSOURI PROJECT.

The Little Missouri River heads in Wyoming, flows northeastward across the southeast corner of Montana and the northwest corner of South Dakota into North Dakota, where it flows northward for 100 miles and then turns eastward, emptying into Missouri River. Reconnaissance was made in 1904 and 1905 and additional investigations in 1909 covering the Little Missouri, Knife, Heart, and Cannon Ball Rivers. It was found that the unregulated flow of the Little Missouri is not sufficient for irrigating much land, and suitable reservoir sites were not discovered. The cost of canal construction would be high. No recent work has been done.

References: 3d annual report, page 447; 4th annual report, page 327; 6th annual report, page 174; 8th annual report, page 149.

MOUSE RIVER PROJECT.

A reconnaissance was made of Mouse River, in northwestern North Dakota, in 1903 and 1904, and a large area of irrigable land, estimated to be about 100,000 acres, was examined. To water these lands would require a canal large enough to divert the flood water. The fall of the river is only about 1 foot to the mile. Mouse River rises in Canada and returns to that country after flowing about 180 miles in North Dakota. The irrigable lands were not surveyed.

References: 3d annual report, page 444; 4th annual report, page 289.

NESSON PROJECT.

This project, located in the northwestern part of the State, in Williams and McKenzie Counties, is one of the proposed pumping projects utilizing the lignite coal in the vicinity for the generation of power for pumping water from the Missouri River for the irrigation of about 16,500 acres of bench and bottom lands near the town

of Nesson, on both sides of the river. Surveys and investigations were made in 1904, 1905, and 1906. No recent work has been done.

References: 3d annual report, page 441; 4th annual report, page 283; 5th annual report, page 231; 6th annual report, page 171.

WASHBURN-OLIVER PROJECT.

This project, located in McLean, Burleigh, and Oliver Counties, in the central western part of the State, was included in the proposed Missouri River pumping projects. The source of water supply would be the Missouri River, supplemented by several creeks. The use of lignite coal mined in the vicinity was planned for the generation of power for pumping. Preliminary surveys were made in 1907 by the State engineer, and surveys and investigations by the Reclamation Service in 1908. Several alternative plans were considered. No recent work has been done.

References: 7th annual report, page 159; 8th annual report, page 150.

NORTH DAKOTA-SOUTH DAKOTA.

BOWMAN PROJECT.

The proposed Bowman project is located in southwestern North Dakota, in Bowman and Adams Counties, and in northwestern South Dakota, in Harding and Perkins Counties. The irrigation plan contemplates the storage of the waters of the North Fork of the Grand River and Spring Creek in a reservoir at the junction of these streams, for irrigating about 10,000 acres of land. Investigations of this project were made in 1906 by the State engineer of North Dakota, and preliminary surveys by the Reclamation Service in 1908. No recent work has been done.

References: 7th annual report, page 167; 8th annual report, page 157.

OKLAHOMA.

CIMARRON PROJECT.

This project is located in northwestern Oklahoma, and derives its water supply from the Cimarron River. It provides for storage of flood waters of that stream or the utilization of the underflow of the Cimarron River Valley, or both, for the irrigation of 10,000 to 14,000 acres of land on both sides of the river. In 1902, 1903, and 1904 reconnaissance and surveys were made. A reservoir site was examined in the vicinity of Garrett, but was considered too expensive for use in connection with this project. Further examinations and studies were made in 1906 and continuing until 1909, resulting in the conclusion that the feasibility of the project was doubtful. No recent work has been done.

References: 1st annual report, page 271; 2d annual report, page 426; 4th annual report, page 297; 6th annual report, page 185; 7th annual report, page 168; 8th annual report, page 159; 9th annual report, page 232.

LAWTON PROJECT.

Located in Comanche County, in southwestern Oklahoma, this project involved the irrigation of 2,500 acres of land lying northwest of the city of Lawton by diverting from Medicine Bluff Creek about 3 miles below Lake Latonka Reservoir. The plan provided for storage of Medicine Bluff Creek waters in Lake Latonka Reservoir, and it is estimated that the capacity of the top 20 feet, which the city of Lawton agreed to donate to the Government, is 12,000 acre-feet. The Lawton project was first proposed in 1911 by a committee representing the citizens of Lawton. An examination of the project was made by the Reclamation Service in 1912. On December 27, 1913, the Secretary of the Interior approved the recommendation of the Reclamation Commission that the Lawton project be taken up under certain conditions. The Lawton Water Users' Association was formed in September, 1914, and attempts were made to secure subscriptions for 1,900 acres of private lands to the project but without success. In May, 1916, the Lawton project office was reopened on the strength of the probability of an irrigation district being organized. Satisfactory progress was made, but following the entry of the United States into the war in April, 1917, and the increased demands on the storage at Lake Latonka for military purposes, further consideration of the project was deferred.

References: 13th annual report, page 239; 14th annual report, page 231.

RED RIVER PROJECT.

This project, located in the southwestern part of Oklahoma, in Comanche, Kiowa, and Greer Counties, proposed to utilize the flood waters of the North Fork of Red River by storage in a reservoir on that stream near Snyder, Okla., with supplemental storage in a reservoir to be built on Otter Creek near Mountain Park, Okla. The Navajo reservoir site near Snyder is the largest and best known, with a storage capacity of 200,000 acre-feet, sufficient for the irrigation of about 80,000 acres. Surveys and investigations were made in 1903, 1904, 1905, and again in 1906. It was believed that the cost would be too high to be considered at that time, and the quantity and quality of water available were also unsolved problems. No further work has been done.

References: 2d annual report, page 414; 3d annual report, page 456; 4th annual report, pages 290 and 294; 6th annual report, page 184.

OREGON.

ANA RIVER PROJECT.

The Ana River project involves the construction of a high diversion dam on Ana River and a canal system covering about 15,000 acres of land around Summer Lake.

References: 3d annual report, pages 53, 473; 6th annual report, page 194; 7th annual report, page 170; 8th annual report, page 160; 9th annual report, page 233.

BAKER (POWDER RIVER) PROJECT.

This project is located in Baker County, in northeastern Oregon. The area included was undertaken as a Carey Act project by the Powder Land & Irrigation Co., which proposed to reclaim 65,000 acres. Their plans included storing the surplus waters of the Powder River in Thief Valley Reservoir and diverting West Eagle Creek into Balm Creek Reservoir, the Powder River water to be used for the irrigation of 40,000 acres and West Eagle water for about 25,000 acres of land. The contract of the company with the State of Oregon has been extended from time to time and is still in force. It was first investigated by the Reclamation Service in 1908 by Consulting Engineer Joseph Jacobs, and later by Engineers Wiley and Fisher in 1919 and 1920.

References: 18th annual report, page 419; 19th annual report, page 424.

CHEWAUCAN PROJECT.

The irrigation plan of the Chewaucan project involves the construction of a storage reservoir on the upper Chewaucan River, a diversion dam near Paisley, and a canal covering about 33,000 acres of land lying north of Paisley and northeast of the Chewaucan Marsh.

References: 3d annual report, pages 53 and 472; 6th annual report, page 194; 7th annual report, page 170; 8th annual report, page 160; 9th annual report, page 233.

COLUMBIA RIVER POWER PROJECT.

This project proposes the development of hydroelectric power at Celilo Falls on Columbia River near The Dalles, Oreg. It is proposed to control the river by a comparatively low weir and develop power by successive units discharging from a broad forebay on the Washington side of the river. The power which can be developed continuously throughout the year aggregates nearly 500,000 electrical horsepower, with the practicability of developing large amounts of additional power for parts of the year. The investigation was made under a cooperative agreement with the State of Oregon during 1914. The report was not published under Columbia River cooperation, but appeared serially in the Journal of Electricity, Power, and Gas, of San Francisco, and the entire report under single cover may be obtained from the publishers of the periodical.

Reference: 15th annual report, page 539.

DESCHUTES PROJECT.

This project is located in central Oregon, in Crook County. It is divided into four divisions known as the North Side Division, the South Side Division, the East Side Division, and the West Side Division, all to be irrigated from the Deschutes River. The total area of the divisions is 203,000 acres, of which 35,000 acres or the East Side Division are included in a Carey Act project. The two reservoir sites are known as the Benham Falls site, on the Deschutes River,

with a capacity 442,500 acre-feet, and the Crane Prairie site, on the West Fork of the Deschutes about 30 miles above Benham Falls, with a capacity of 95,000 acre-feet. Diamond drilling investigations of the Benham Falls dam site have been completed and a report on the geological features of the Benham Falls site and the Crane Prairie site has been submitted. An appropriation of $400,000 for beginning construction and incidental operations is provided for in the sundry civil act for the fiscal year ending June 30, 1922. A board of engineers is now considering the power, storage, and irrigation possibilities on the Deschutes River.

References: Oregon Cooperative Work, Deschutes project, December, 1914; 15th annual report, page 528; 19th annual report, page 424.

HARNEY PROJECT.

This project is located in eastern Oregon, in the northern part of Harney County, and proposes the regulation of the water supply from Silvies River; first, for the higher development of about 60,000 acres which has been under a crude flood system of irrigation, by complete storage control and more scientific use of the water supply; and, second, the irrigation of about 40,000 acres of additional land. The capacity proposed for Silvies Valley Reservoir is 100,000 acre-feet, and for Lower Silvies Reservoir, which will receive the run-off from Emigrant Creek, 70,000 acre-feet. There is considered with the project the possibility of using Blitzen River water for the irrigation of a part of Harney Valley, together with the possible drainage and irrigation of a part of Malheur Lake bed, in addition to the area reclaimed from the same source by the Blitzen Valley Land Co. The Harney Valley project has been organized as an irrigation district. Practically all of the irrigable lands are in private ownership.

References: 2d annual report, page 435; 3d annual report, pages 103 and 469; 15th annual report, page 529; Oregon Cooperative Work, Harney and Silver Creek projects, February, 1916.

JOHN DAY PROJECT.

This project is located in Morrow County, in northern Oregon, and has an irrigable area of 122,000 acres along the south side of Columbia River between the John Day River on the west and the Umatilla River on the east. The water supply is the John Day River with storage of 112,000 acre-feet at Dayville and 133,000 acre-feet at Carty Reservoir site about 25 miles east of John Day River in the upper edge of the irrigable area. The proposed point of diversion is in the canyon of the river at what is known as the Bull Basin dam site. The cost of the project would be high, the most expensive feature being the cost of the feed canal, which it is estimated will be about 40 per cent of the entire cost. The early investigations of this project were also directed toward the utilization of the waters of the Umatilla River.

References: 15th annual report, page 529; Oregon Cooperative Work, John Day project, February, 1916.

MALHEUR PROJECT (WARM SPRINGS IRRIGATION DISTRICT).

This project, in the eastern part of the State of Oregon, consists of 39,000 acres of irrigable land lying on both sides of the Malheur River for a distance of 25 miles and centering about Vale, Oreg. The project has been investigated by the Reclamation Service independently and also in cooperation with the State of Oregon. An irrigation district formed some years ago issued and sold bonds for construction purposes and has constructed the Warm Springs Reservoir, with a capacity of 170,000 acre-feet, some 60 miles above the project on the Malheur River and a distribution system for part of this area,

References: Oregon Cooperative Work, Malheur and Owyhee projects, February, 1916; 3d annual report, pages 102, 123, 463; 4th annual report, pages 301, 355; 5th annual report, page 253; 6th annual report, page 193; 7th annual report, page 171; 8th annual report, page 160; 15th annual report, page 530; 16th annual report, page 361.

OCHOCO PROJECT.

The Ochoco Irrigation District is located in Crook County, central Oregon. The project plans involve the irrigation of some 15,000 to 22,000 acres in the vicinity of Prineville from storage on Ochoco Creek, the dam site being located about 6 miles above the town. The Ochoco Irrigation District has undertaken the construction of the project, a portion of which is practically completed.

References: Oregon Cooperative Work, Ochoco project and Crooked River investigations, 1915; 15th annual report, page 531; 17th annual report, page 384.

ODELL AND CRESCENT LAKES PROJECT.

This project contemplates the storage of the flood waters of Odell and Crescent Lakes and of the East Fork of the Deschutes River and their diversion across the Walker Mountains to the Silver Lake Desert. It is estimated that there is sufficient supply for about 65,000 acres.

References: 3d annual report, page 475; 6th annual report, page 194.

OWYHEE PROJECT.

This project is located in Malheur County, in eastern Oregon. The original project included about 80,000 acres on the west side of Snake River north and south of the Owyhee, joining the Warm Springs or Malheur project on the north in the vicinity of Ontario and extending far enough south to include the 30,000 acres in the Gem Irrigation District, now irrigated by pumping from the Snake. The present plan provides for storage at the Duncan Ferry site, located on the Owyhee River about 110 miles from its mouth. A diversion dam is to be located 3 miles above Mitchell Butte, 66 feet above low-water level, with the main canal starting from the level of the diversion-dam crest. At several points the supply for lower level canals can drop through turbines driving direct-connected centrifugal pumps raising water to levels above the main canal. An irrigation district has been formed covering part of these lands.

A contract has been entered into with the State of Oregon, under date of May 17, 1921, for the purpose of making a complete investigation of this project.

References: 3d annual report, page 466; 4th annual report, page 303; 15th annual report, page 532; 16th annual report, page 361; 18th annual report, page 418; Oregon Cooperative Work, Malheur and Owyhee projects, February, 1916.

ROGUE RIVER VALLEY PROJECT.

Located in southwestern Oregon, in Jackson County, this project lies west of the Cascade Mountains, where, on account of the high annual precipitation, little attention has been given to possible projects. During the growing season, however, the precipitation is very small, and irrigation is essential to the best agricultural development. Rogue River Valley is the name generally applied to that portion of Rogue River Basin about Medford and extending from Ashland on the south to Tolo on the north, where high-grade apple and pear orchards have been developed. Investigations and surveys have been made by the Reclamation Service in cooperation with the State of Oregon. The project includes development of the water supply approximately as proposed by the Rogue River Valley Canal Co. as to the Medford Division and development of the Ashland Division by storage in Buck Lake, Hyatt Prairie, or Beaver Creek Reservoir sites. The land is practically all in private ownership and in cultivation, most of it in small tracts and planted to orchards. Two irrigation districts have been organized, one including about 20,000 acres near Medford and the other in the vicinity of Talent including about 8,500 acres. The latter has voted and sold bonds, and construction is under way.

References: 15th annual report, page 533; 16th annual report, page 361; Oregon Cooperative Work, Rogue River Valley, February, 1916.

SILVER CREEK PROJECT.

Silver Creek project is located in eastern Oregon, in Harney County. It is proposed to irrigate about 12,000 acres of land, not now irrigated, in Silver Creek Valley from storage to be provided in the upper Silver Creek Reservoir site, which will also provide storage for 12,000 acres now irrigated with an insufficient water supply. The proposed reservoir has a capacity of 40,000 acre-feet with a dam 72 feet high. Development by pumping and storage is proposed at some future date for the Warm Springs Division by the use of the water supply from Warm Springs in the lower end of Silver Creek Valley, of which there is estimated to be about 15,000 acre-feet. No power development is practicable on this project, though if it could be obtained at a reasonable cost it would simplify the development of the lower valley, where low-lift pumping is proposed from Warm Springs to Silver Lake. Almost the entire irrigable area of Silver Creek Valley and Warm Springs Valley is in private ownership. An irrigation district has been organized which includes some 17,000 acres in Silver Creek Valley.

References: 3d annual report, page 471; 15th annual report, page 535; Oregon Cooperative Work, Harney and Silver Creek projects, February, 1916.

SILVER LAKE PROJECT.

Silver Lake project is located in northern Lake County, central Oregon. The principal development proposed is the irrigation by gravity water supply, with storage, of some 16,000 acres in the vicinity of the town of Silver Lake, and about 32,000 acres near Fort Rock. The Thompson Valley Reservoir site will store about 60,000 acre-feet by diversion of the spring run-off of Sycan River and Long and Coyote Creeks. By storage on lower Buck Creek at the Emery Reservoir site and a drainage canal through the marsh to Silver Lake it is estimated that about 9,000 acres of Paulina Marsh may be reclaimed. The possible development of summer power on Silver Creek from Thompson Valley storage is proposed for use in pumping to reclaim part of Silver Lake bed, pumping from ground water to supply additional lands in Fort Rock Valley, and in pumping from Ana River Springs for the irrigation of about 20,000 acres of land in Summer Lake Valley. Most of the lands are in private ownership and an irrigation district is being organized for the development of lands in the vicinity of Fort Rock.

References: Oregon Cooperative Work, Silver Lake project, October, 1915; 4th annual report, page 306; 15th annual report, page 535.

UMATILLA PROJECT EXTENSIONS.

Located in northeastern Oregon, in Umatilla and Morrow Counties, there are 35,000 to 40,000 acres of excellent land adjoining the Umatilla project which can be irrigated if additional storage is provided on the Umatilla River, or its tributaries. About 13,000 acres of land irrigated under private irrigation systems lack a sufficient supply. Numerous petitions have been presented to the department asking the Government to provide relief for the settlers by constructing adequate storage facilities, and investigations have been made to determine the feasibility of providing additional water for the lands already cultivated and of increasing the irrigable area by extension and enlargement of the present private canal systems. The construction of a dam on McKay Creek about 5 miles above its mouth would store 70,000 acre-feet and the run-off of McKay Creek could be supplemented by diversion from Birch Creek below Pilot Rock.

References: 18th annual report, page 420; 19th annual report, page 424.

WARNER VALLEY PROJECT.

Warner Valley is located in south-central Oregon, in the eastern part of Lake County. The northern end of the valley reaches into Harney County and the southern end extends nearly to the State boundary. Various plans were considered by the Warner Lake Irrigation Co., organized under the Carey Act. An investigation was made by the Reclamation Service in 1915 in cooperation with the State of Oregon and the plan proposed the drainage of 46,000 acres in South Warner Valley, and the irrigation of about 33,000 acres of these lands by gravity canals and 27,000 acres in north Warner Valley by pumping. It was proposed to develop about 2,000 horsepower on Deep Creek for operating dredges during construction and to furnish power for four pumping plants in north Warner Valley after

construction. It was planned to take care of the excess run-off of Deep Creek by storage at Big Valley on Deep Creek, and in Coleman Valley, which receives little or no run-off and is lower than the lands of south Warner Valley proposed to be reclaimed by drainage.

References: 2d annual report, page 438; 15th annual report, page 536; Oregon Cooperative Work, Warner Valley and White River projects, February, 1916.

WHITE RIVER PROJECT.

White River project is located in northern Oregon, in Wasco County. The source of water supply is White River, which heads in one of the glaciers of Mount Hood and flows into the lower Deschutes River. The plan proposed the irrigation of some 36,000 acres on both sides of White River above its junction with the Deschutes. Storage is proposed at Clear Lake. A power plant on White River below the proposed diversion would have to be taken over to permit the full development of the project. It would also be necessary to consider the development work and water-right claims of the Wapinitia Irrigation Co. For these reasons it is concluded that the project as proposed will become attractive only when the demand for irrigation is sufficient to make economically desirable the absorption of all other claims to the available water supply.

References: 15th annual report, page 537; Oregon Cooperative Work, Warner Valley and White River projects, February, 1916.

WILLAMETTE VALLEY INVESTIGATIONS.

The Willamette Valley, in northwestern Oregon, extends southward from Portland more than 100 miles. Field investigations and studies were made of this valley in connection with the cooperative work with the State of Oregon. It is concluded in the report that lands of the valley can, with drainage and irrigation, be made in general to probably double their yield in years of ordinary precipitation and that storage can be developed at Waldo Lake, but that it is inadvisable to undertake a comprehensive irrigation project in Willamette Valley until such time as drainage is more advanced and the demand for irrigation becomes more apparent.

References: Oregon Cooperative Work, Willamette Valley investigation, February, 1916; 15th annual report, page 538.

OREGON-CALIFORNIA.

KLAMATH PROJECT, HORSEFLY STORAGE.

Horsefly Reservoir site is located in Klamath County, in southern Oregon, on Miller Creek, a tributary of Lost River. This reservoir will serve the double purpose of aiding in the reclamation of the bed of Tule Lake and impounding flood waters that can be used in reclaiming lands in Youna and Langell Valleys. With Miller Creek regulated the area to be reclaimed from the bed of Tule Lake will be uncovered at a much earlier date. Detail investigations in Langell and Youna Valleys have not been made. The lands included in the Horsefly Reservoir site are in private ownership, as are the lands in Youna and Langell Valleys irrigable from the Horsefly Reservoir.

The Tule Lake lands are public lands. A dam 66 feet in height would store some 75,000 acre-feet.

KLAMATH PROJECT, MODOC DIVISION.

This proposed division consists of bench land located in Modoc County, northern California, together with part of the present and prospective reclaimed bed of Tule Lake. It is proposed to tap Clear Lake Reservoir at its southern extremity and to construct a main lateral about 18 miles in length with proper sublaterals to serve the various areas of irrigable land. Of the 5,700 acres of bench land about 1,000 acres are public land, the balance being State land and land in private ownership. The reclaimed lake bed, amounting to 4,500 acres, is almost entirely in Government ownership. It is proposed to use part of the stored waters of Clear Lake Reservoir, already constructed, with a capacity of 442,000 acre-feet. There is sufficient fall in the proposed main lateral to develop some 1,500 to 1,600 horsepower.

KLAMATH PROJECT EXTENSION, LANGELL VALLEY DIVISION.

Located in Klamath County, in southern Oregon, Langell Valley Division was originally included in the Klamath project, to be irrigated from storage in Clear Lake. In 1912 the northern portion of the valley was included in the Horsefly Irrigation District and it was planned to construct a storage reservoir on Miller Creek to irrigate the lands from this source. Inability to raise the necessary funds for construction resulted in the project being dropped and the lands have been withdrawn from the Horsefly Irrigation District. The owners later formed an irrigation district to embrace only the irrigable lands in Langell Valley, amounting to about 20,000 acres, with the purpose of constructing a distribution system and securing stored water from Clear Lake and Horsefly Reservoirs. A contract is being negotiated for a water supply from Clear Lake Reservoir and construction of a distribution system for the 6,000 acres on the west side of Lost River. All of the land is in private ownership.

References: 3d annual report, page 203; 4th annual report, page 83; 18th annual report, page 420.

KLAMATH PROJECT EXTENSION PUMPING DIVISIONS.

Located in Klamath County, in southern Oregon, adjacent to the Klamath project are several proposed pumping divisions, aggregating about 20,000 acres of irrigable land. The divisions vary in size from 200 acres to 6,000 acres. The proposed lifts are from 15 feet to 70 feet. All of the land is in private ownership. Water will be stored in Upper Klamath Lake and carried through the main project canal after diversion at the outlet of Upper Klamath Lake. The divisions are as follows: Miller Hill, area south of Miller Hill, Spring Lake area, Manning Ridge, area south of C Canal, White Lake, Stukle Mountain, Dodd's Hollow, Shasta View, Bloody Point, North Poe area, South Poe area, and Muss Lake. These divisions have been thoroughly investigated and a study of the water supply has been made determining the feasibility of the various pumping projects.

Reference: 18th annual report, page 420.

SOUTH DAKOTA.

ANGOSTURA PROJECT.

The Angostura project is located in Custer and Fall River Counties, in southwestern South Dakota. The irrigation plan proposed the construction of a combined storage and diversion dam across the Cheyenne River at a point known locally as Jackson Narrows for the irrigation of from 60,000 to 80,000 acres of irrigable land. Practically all of the irrigable lands are in private ownership or belong to the State. The reservoir with a dam 163 feet in height has a total capacity of 350,000 acre-feet, 250,000 acre-feet being available for irrigation. The outlet from the reservoir would be by means of a tunnel 1,000 feet long located 100 feet above the bed of the river. An investigation was made in 1913 by the State engineer. Further surveys and investigations were made by the Reclamation Service in cooperation with the State of South Dakota in 1917 and 1918. The estimates made show high costs and a board of review in considering the report concluded that until values of agricultural land throughout the United States have greatly advanced the Angostura project is not financially feasible.

References: 2d annual report, page 447; 3d annual report, page 493; 4th annual report, page 327; 17th annual report, page 385; 18th annual report, page 421.

BELLE FOURCHE PROJECT EXTENSION, CHICKEN CREEK RESERVOIR.

Chicken Creek Reservoir site is located in western South Dakota, in Lawrence County, and covers a natural basin near Chicken Creek. It is proposed to construct a dam to provide storage of 12,800 acre-feet, the water to be impounded being the flood waters of Spearfish Creek. This will be used to supplement the natural flow of Belle Fourche River and Redwater Creek during low-water periods. There are now some 3,500 acres of land under the Intake Canal and Johnson Lateral that are not supplied with storage which have at times suffered a lack of sufficient water. The plan contemplates cooperation with the Red Water Canal Association, which controls the Chicken Creek Reservoir site and irrigates 4,800 acres of land south of the Belle Fourche River, diverting from Redwater Creek, but which also have an insufficient water supply. An investigation of foundations was made at this site and report on test borings submitted in December, 1920.

Reference: 18th annual report, page 421.

TEXAS.

LOWER RIO GRANDE PROJECT.

This project is located in Starr, Hidalgo, and Cameron Counties, in southeastern Texas. With the exception of a comparatively narrow valley extending westward from Closner, the irrigable area consists of a roughly triangular body of land having its apex near the town of Closner and its base bordering on the Gulf of Mexico. The southern side of the triangle is formed by the Rio Grande, and an irregular line

running north of the towns of Mission, Edinburg, and Raymondville to Laguna Madre constitutes its northern boundary.

Within these limits it is estimated that there are approximately 1,000,000 acres of fertile soils that could, under favorable conditions, be made productive by irrigation from the Rio Grande. Two-thirds of this area is included in the first bench lands adjoining the river and in the great coastal plain bordering the Gulf. The remainder of the irrigable area is located on second and third benches extending from Weslaco to Closner.

The climate is semitropical, such that agricultural crops may be grown, under irrigation, every month of the year, and such as to permit great latitude in the rotation of crops. The principal products are cotton, winter vegetables, forage crops, citrus fruits, and sugar cane. Practically all of the present development has taken place since the construction of the St. Louis, Brownsville & Mexico Railroad in 1904–1906. Land-promotion companies purchased tracts of 2,000 to 100,000 acres at nominal prices and constructed irrigation systems to give them an agricultural value. Pumping plants were installed on the river banks to raise the water into canals running back into the country. No comprehensive plan of development was undertaken and there was no cooperation between the promoters, each of them constructing independent systems, the prime object being to get water upon the land at the lowest first cost and dispose of their holdings at a profit as quickly as possible. Fifteen of these projects have plans for the irrigation of 400,000 acres and furnished a more or less satisfactory water supply to 169,000 acres in 1920.

As the agricultural development has progressed a dozen or more prosperous towns, having from 300 to 5,300 inhabitants, have sprung up along the line of the railroad. The population of Hidalgo and Cameron Counties has risen from 22,932 in 1900 to 75,651 in 1920, and their assessed valuation has increased more than $41,400,000 during the same period.

As a result of the torrential rains that follow tropical storms along the Gulf coast, the river overflows its banks from time to time, flooding the first bench lands and extensive areas of the coastal plain. During these floods the river often changes its course and thereby the location of the boundary line between the United States and Mexico. These floods furnish a continuing menace to the pumping plants and in some instances have already necessitated the digging of inlets from the river to the pumps; in other places the plants have been destroyed by the encroachments of the river.

At present the water supply is entirely dependent upon the unregulated flow of the Rio Grande below Fort Quitman, Tex., an international stream in which both the United States and Mexico have indisputable but as yet undetermined rights. The river discharge is exceedingly variable, and during periods of minimum run-off some of the present systems have found it difficult or impossible to furnish an adequate water supply for the lands now in cultivation. The silt and seepage problems, as well as the high cost of irrigation service, are also matters of serious concern to the canal companies and to the farmers.

In order to overcome or minimize these difficulties and to provide water for as much of the irrigable land as possible, it has been proposed to construct storage reservoirs on the middle Rio Grande and one or

more of its tributaries and to build gravity canal systems, diverting from the lower river, for the distribution of the available water supply.

Preliminary investigations of this project, under the terms of a cooperative agreement between the Reclamation Service and the Rio Grande Conservation Association, have recently been completed.

So far there has been practically no irrigation development on the Mexican side of the Lower Rio Grande Valley, but there are reported to be large areas of good land south of the river, and it is quite certain that an attempt will be made to irrigate them in the not distant future.

Until some agreement is reached between the two Republics for the equitable division of the available water supply, the extent of safe irrigation development of either side of the river can not be determined.

Article VII of the treaty of February 2, 1848, declares the Rio Grande to be a navigable stream, common to both countries, and that "neither shall, without the consent of the other, construct any work that may impede or interrupt, in whole or in part, the exercise of this right; not even for the purpose of favoring new methods of navigation."

There has been no navigation on the river for many years and there is no prospect of any in the future, but this provision of the treaty is still in force, and until it is abrogated no storage or diversion dams may be constructed across the channel of the Rio Grande.

In order to insure maximum irrigation development on both sides of the river, reduce damage from floods, and stabilize the boundary line between the two countries, a new treaty should be made doing away with the present fallacy of river navigation and providing for the joint construction and use of storage reservoirs on the Rio Grande and its tributaries, and for the equitable distribution of the entire water supply, due regard being given to present and prospective agricultural development and sources of water supply.

A study of all run-off records of the river shows that 200,000 acres is about all that can be safely developed in the lower valley from its unregulated discharge, but that by the construction of storage reservoirs on the middle Rio Grande and on its tributaries lower down it may be possible to reclaim as much as 1,000,000 acres.

For irrigation purposes the peculiar topography of the valley in Texas divides the project into two divisions, one covering the eastern portion, embracing about two-thirds of the irrigable area, the other including nearly all second bench lands, a narrow strip above Closner, and such first bench areas as can not be reached by the canal for the first division. With practically an unlimited irrigable area and an indeterminate ultimate water supply, no definite limits can be fixed for the final development of the Lower Rio Grande Valley on the American side of the river, but within the boundaries adopted it is estimated that there are 795,000 acres of irrigable land, all of which is in private ownership. Of this area 40,000 acres are located above Penitas, 12,000 acres on the Mission tract, which can only be reached by pumping, and 134,000 acres are expected to be supplied with water developed by drainage systems to be constructed. To properly irrigate the project, as outlined, all of the available water supply,

exclusive of the flood flows of the San Juan and Salado Rivers in Mexico, will be required.

To conserve flood waters that now go to waste reservoirs are contemplated on the Rio Grande near Mariscal and on the Devils River, having capacities of 4,400,000 acre-feet and 250,000 acre-feet, respectively. The stored water when needed will be turned into the natural channel, which it will follow to dams at the head of service canals diverting from the lower river. To serve the lower and larger division of the project, it is proposed to construct a low weir across the Rio Grande near La Lomita Mission, where a maximum of 5,550 second-feet will be diverted into a gravity canal to supply 444,200 acres of land. Ten miles below its intake this canal divides into two branches, one running in a northerly and northeasterly direction for some 45.5 miles for the irrigation of nearly all the area north of Arroyo Colorado; the other follows the high land north of the river to serve the acreage south of the Arroyo. Distribution will be made through present lateral systems and others to be constructed. The 134,000 acres to be irrigated with return water are also located in this division.

To supply the upper division by gravity it is necessary to raise the river at La Piedra dam site 60 feet above its bed and to construct approximately 64 miles of carriage canal in difficult country, through and along the steep sides of gravel and sandstone hills and across many large drainage channels. On account of the great cost of this undertaking a number of alternative schemes have been considered for serving this division of the project. Apparently the most feasible plan would be to build a low diversion dam across the river opposite Penitas for turning the water into a receiving basin at the base of the hills, from which it would be lifted into service canals, 32 feet and 60 feet higher, by pumping plants located on the hillside above maximum flood heights. To develop power for this purpose it is proposed to build a dam and generating station at La Piedra, above Roma, with a 60-mile transmission line to Penitas. The higher canal would supply water to all of the second bench lands; the lower lift would provide for the areas at lower elevations.

Distribution would be through existing laterals and others to be built. If this plan should be adopted, the area of this division would be reduced to 177,500 acres, or the 40,000 acres west of Penitas would be served by independent pumping plants which could be supplied with power from the transmission line previously referred to. The successful development of this project depends upon limiting its area to the available water supply, as determined by international agreement, and the possibility of adjusting land values and existing liens on a basis that will make its construction financially feasible.

References: 18th annual report, pages 421–423; 19th annual report, pages 425, 426.

LOWER RIO GRANDE VALLEY DRAINAGE AND FLOOD CONTROL.

On November 29, 1920, a contract was executed between the Reclamation Service and the Rio Grande Valley Chamber of Commerce for an investigation of the feasibility of providing flood protection and main drainage channels for large areas of land in Hidalgo

and Cameron Counties, Tex. To cover the cost of this work, the chamber of commerce agreed to provide not less than $10,000 by May 1, 1921. Up to the end of the fiscal year $5,000 of this amount had been paid. A large amount of hydrographic data has been assembled and studies made of the origin, progress, and extent of the recorded floods in the Rio Grande. Profile and cross-section levels have been run along the main drainage channel from Penitas to Donna and from the north end of Lake Campacuas to and across the St. Louis, Brownsville & Mexico Railroad between Raymondville and Lyford. Topographic maps on a scale of 400 feet to the inch, with contour intervals of 2 feet, have been made from Donna to and some distance down the Arroyo Colorado and from Llano Grande Lake to and beyond the lower end of Campacuas Lake, including hundreds of soundings in both bodies of water. A map of the overflow area between Penitas and the Gulf has also been made on a scale of 2,000 feet to the inch. Investigations are still in progress.

Reference: 18th annual report, page 427.

UTAH.

BEAR LAKE PROJECT.

This project, located in southern Idaho and northern Utah, proposes the irrigation of 300,000 or more acres in these States, mainly along Bear River. Storage to be provided in Bear Lake, in northern Utah. The project was investigated in the earlier years of the Reclamation Service, but no recent work has been done.

References: 1st annual report, page 282; 2d annual report, page 475; 3d annual report, pages 53 and 514; 4th annual report, page 330; 5th annual report, page 273; 6th annual report, page 223; 7th annual report, page 185; 15th annual report, page 541.

CASTLE PEAK PROJECT.

Preliminary surveys of irrigable areas and distribution system including a storage reconnaissance of the Duchesne River watershed were completed during the fiscal year. This work was under the direction of Assistant Engineer Walter L. Drager, and the following is taken from his report dated December, 1920:

Location and general description.—Reference is made to previous accounts of this project on pages 386, 423, and 427 of the seventeenth, eighteenth, and nineteenth annual reports, respectively. The Castle Peak investigation deals with the irrigation possibilities of bench lands south of the Duchesne River in Duchesne and Uintah Counties, Utah. The principal development considered is the irrigation by gravity of 19,000 acres on the Myton Bench and in Pleasant Valley, in the vicinity of the town of Myton, and 29,000 acres on the Pariette Bench about 20 miles south of Myton.

Principal features.—

Main Canal: Length 35 miles, including 2 miles of tunnel; capacity, 800 second-feet to 200 second-feet.

Diversion Dam: Location on Duchesne River at Cottonwood Gulch, 5 miles below junction of Duchesne and Strawberry Rivers; length, 3,000 feet; spillway, 600 feet, concrete ogee weir and radial gates.

Storage: 95,000 acre-feet at Starvation Reservoir, on Strawberry River, 4 miles above Duchesne; dam 130 feet high, earth fill, length on top 2,000 feet; 6-mile feeder canal from Upper Duchesne, capacity 400 second-feet.

Duty of water and demands.—A diversion duty of 3.75 acre-feet per acre has been estimated for the project lands, and is based upon data secured from the United States Indian Service irrigation project in the Duchesne Valley and estimates furnished by the Federal court water commissioner who has been distributing water among the private ditches diverting from Lake Fork and other tributaries in this vicinity. This information is fairly complete and it is believed furnishes a very reliable basis upon which to estimate the requirements of the Castle Peak lands. There is a total area of 68,000 acres under existing canals diverting from the Duchesne and having prior rights over the Castle Peak project, with a total net demand of 106,000 acre-feet annually. This amount is in addition to such return flow as may be available for rediversion. The annual net demand of the Castle Peak project with 48,000 acres will be 171,700 acre-feet.

Water supply.—The mean annual run-off of the Duchesne River past the proposed diversion (1899–1919) is 468,000 acre-feet and the minimum for this period is 279,000. The discharge usually reaches its peak in June and continues high until early in July, when it falls off rapidly, and from the middle of July until the end of the irrigation season the river maintains a fairly uniform flow not greatly in excess of 500 second-feet. This early run-off will create a water shortage beginning in July of most years and continuing through August. When fully developed, the areas under prior right canals would experience shortages in 9 years of the 21-year period considered. The Castle Peak project, having a demand of 171,700 acre-feet annually, would have an insufficient supply from the natural flow of the river in 19 years of the period. The critical period in the years of record is 1900–1903 and the amount of storage required at Starvation Reservoir (Lower Strawberry) to fully cover this period would be 300,000 acre-feet. However, it has been assumed that a 30 per cent maximum shortage would be allowable during these years, and by supplementing the supply of the Strawberry by means of a feeder canal from the Upper Duchesne the storage requirement is reduced to 95,000 acre-feet.

Estimated costs.—All estimates are based upon 1920 market conditions, assuming a maximum haul of 80 miles from a railroad for cement, steel, flume, and siphon material, and construction equipment.

Summary total cost of project.

Main Canal (including tunnels)	$3,181,000
Lateral system	734,000
Pleasant Valley drainage	56,700
Diversion Dam and headworks	494,000
Starvation Reservoir (capacity 95,000 acre-feet)	3,669,000
Feeder Canal	264,600
Telephone system, buildings, etc	50,000
Investigations and surveys	100,000
Operation and maintenance during construction	150,000
Total (48,000 acres, at $180)	8,698,700

Possible extensions.—In addition to the 48,000 acres considered, there are several small units which might be supplied by extensions to the proposed system. On the Leland Bench there are 7,000 acres which could be reached by a gravity canal diverting from Pleasant Valley, and by pumping 90 feet above the Main Canal at three different points additional areas aggregating 10,300 acres might be irrigated. This development is, however, contingent upon a modification in the demands as estimated for the prior right canals. If all of the areas under prior right canals in the valley were fully developed there would be no water available for these units, unless additional storage could be found.

Conclusions.—As a result of the investigations and estimates, it is concluded—

(*a*) That the water supply is adequate, with storage, for the development of the Castle Peak project up to 48,000 acres, including the entire gravity system with the exception of the Leland Bench areas, but that the supply for the Leland Bench and the various pumping divisions is very uncertain.

(*b*) That the project presents no insurmountable engineering features and is feasible from a construction standpoint.

(*c*) That good bench lands in the vicinity of this project can be purchased with water right and improvements for $75 per acre.

(*d*) That the lands proposed to be irrigated are excellent for the production of grain and forage crops and will stand a construction charge of $90 or possibly $100 per acre, assuming that payments are distributed over a period of 20 years.

(*e*) That the construction cost of the project will be approximately $180 per acre, based upon work being done by the Reclamation Service at present prices and with funds that do not bear interest.

(*f*) That the proposed extensions are infeasible on account of the high cost of additional storage required.

(*g*) That the Castle Peak project as a whole is not feasible for construction under present market conditions and transportation facilities, but that if a railroad is extended into the Duchesne Valley the reduction in cost of construction and a corresponding increase in land values might make this a feasible project.

DIXIE PROJECT.

The proposed project is located on the south boundary line of Utah, in Washington County, extending into Mojave County, Ariz. The irrigable area lies south of the Virgin River, southeast of the town of St. George, and southwest of the town of Hurricane, comprising about 40,000 acres. The source of the water supply is the Virgin River, supplemented by possible storage in Long Valley near Mount Carmel, Utah. Practically all of the land under this project is public land. The soil and climate are excellent, but the project is located a long distance from a railroad and large markets. Additional investigations and surveys will be required before the project can be pronounced feasible.

References: 17th annual report, page 386; 19th annual report, page 428.

GREEN RIVER PROJECT.

This project was largely covered by the Utah Carey Act segregation No. 10, made by the Green River Canal Co. Other than surveys and a few miles of wagon roads, this company did no work and its filings were canceled September 7, 1920.

In May, 1921, the Reclamation Service, in cooperation with individuals of the State of Utah, began an investigation of the project, and this work is now in progress.

Reference: 19th annual report, page 428.

PRICE RIVER PROJECT.

The proposed project is located in central Utah, in Carbon County. The irrigable area lies northeast of the Price River in what is known as Clarks Valley and comprises about 60,000 acres of land. It is proposed to impound the flood water on the Fish Creek branch of Price River in the Pleasant Valley Reservoir site near Schofield, Utah, having a capacity of 175,000 acre-feet. The present low water flow of Price River is all appropriated and used on lands of the Price River Irrigation Co. and smaller tracts in the vicinity of Price. The developed water supply will be used to furnish an additional supply for the 8,000 acres of the Price River Irrigation Co.'s land and a large area of Government land in Clarks Valley which has been withdrawn from entry. In 1917 the Mammoth Reservoir Dam of the Price River Irrigation Co. failed and the Reclamation Service was asked to examine the project to ascertain what steps could be taken to assure the settlers a sufficient water supply. Preliminary investigations and surveys have been made. No work was done during the last year except the maintenance of a gaging station on Fish Creek near Schofield.

References: 3d annual report, page 111; 17th annual report, page 386; 19th annual report, page 428.

STRAWBERRY VALLEY PROJECT, JUAB EXTENSION INVESTIGATIONS.

This project is located in central Utah, in eastern Juab County, and embraces 30,000 to 40,000 acres to be irrigated from the Strawberry Valley Reservoir and additional storage on Willow Creek and Diamond Fork. Investigations were made in 1919 and 1920. A board of engineers reporting on the project under date of June 11, 1920, states that in its opinion the project was not feasible.

Reference: 19th annual report, page 429.

UTAH LAKE PROJECT.

This project is located near the center of the State and deals with the supply of water for southern Salt Lake and Utah Lake Valleys. Utah Lake serves as a storage reservoir, but owing to its great size about two-thirds of all the water reaching the lake is lost by evaporation. When all the problems connected with the project were ascertained, it was considered of doubtful feasibility.

References: 1st annual report, page 279; 2d annual report, pages 66 and 451; 3d annual report, pages 52, 108, and 494; 4th annual

report, page 329; 5th annual report, page 274; 6th annual report page 223; 7th annual report, page 188; 15th annual report, page 541

WASHINGTON.

COLUMBIA BASIN PROJECT.

The Columbia Basin irrigation project is located in southeastern Washington and proposes the irrigation of 1,753,000 acres of land, using a gravity supply of water from the Pend Oreille River, designated by the United States Geographic Board as Clarks Fork. This source is regarded as ample to meet the irrigation demand. The investigation, surveys, and studies were made by the Columbia Basin Survey Commission, State of Washington, authorized by an act of the legislature in 1919. The United States Reclamation Service assigned D. C. Henny and James Munn as consulting engineers to cooperate in the study of the general features of the work. A report containing 185 pages (printed) was issued by the commission in 1920. The cost of the completed project is estimated by the commission at not less than $171.40 per acre. Storage can be provided in Flathead Lake, with a capacity of 1,506,000 acre-feet, and Pend Oreille Lake, with a capacity of 1,180,000 acre-feet. Storage in Flathead Lake will add largely to the power possibilities in the Flathead and Clarks Fork Rivers. A review of the report of the Columbia Basin Survey Commission was made by a board of engineers, consisting of D. C. Henny, James Munn, and C. T. Pease, on December 13, 1920.

METHOW-OKANOGAN PRO ECT.

This project, located in the northern part of the State of Washington, in Okanogan County, was proposed by the State Reclamation Board of Washington, at whose request D. C. Henny was appointed by the Reclamation Service to act in a consulting capacity. The plan proposes the development of lands in Okanogan Valley from Riverside down to the Columbia River and along the Columbia both up and down stream from the mouth of the Okanogan River. The principal feature is a 14-mile tunnel to divert the waters of the Methow River to irrigate the lands in Okanogan Valley and to furnish a supplemental water supply to the existing Okanogan project. Various projects have been considered, embracing areas of from 23,000 acres to 46,000 acres. The acre cost is high, ranging between $240 and $300 per acre.

Reference: 19th annual report, page 430.

PALOUSE PROJECT.

This project, as originally planned, proposed the irrigation of lands in Whitman, Walla Walla, and Franklin Counties, in southeastern Washington, by the utilization of the waters of the Palouse River. Owing to the unfavorable results of the earlier investigations, recommendations were made by consulting engineers against construction. In 1913, under cooperative agreement with the State of Washington, further investigations were made. A report was made in 1914, which was reviewed by a board of engineers. This board regarded the cost

per acre as prohibitive at that time and questioned the feasibility of the Washtucna Reservoir site. Some of the lands in this project in Walla Walla and Franklin Counties have since been considered in connection with the proposed Pasco or Lower Snake River and Columbia Basin projects

References: 2d annual report, page 488; 3d annual report, page 600; 4th annual report, pages 345, 356; 5th annual report, page 292; 13th annual report, page 289; 14th annual report, page 279; 15th annual report, page 541.

PASCO (LOWER SNAKE RIVER) PROJECT.

Investigations were made under cooperative agreement with the State of Washington of this proposed project which is located in southeastern Washington, in Franklin and Walla Walla Counties. The water supply is to be taken from the Snake and Columbia Rivers. The plan of irrigation contemplates the construction of a 40-foot dam across the Snake River about 5 miles above its mouth to generate power for pumping from both the Snake and Columbia. The maximum lift from the Columbia would be approximately 250 feet and from the Snake 220 feet. The lands to be irrigated, of which there are some 60,000 acres, mostly in private ownership, were originally included in the Palouse project on the basis of a gravity supply from Palouse River. Work during fiscal year 1921 consisted of water measurements, soil surveys, crop census surveys, and valuation of lands.

References: 2d annual report, page 440; 3d annual report, page 602; 4th annual report, page 343; 19th annual report, page 430.

PRIEST RAPIDS PROJECT.

The Priest Rapids project contemplates the irrigation of lands from the Columbia River in the central part of Washington, located in Douglas, Benton, and Franklin Counties. There are three tracts, the Priest Rapids, Pasco, and Rattlesnake, lying on both sides of the Columbia River, the total irrigable area comprising 100,000 to 150,000 acres, which can be reached partly by gravity and partly by pumping. Power required for pumping might be generated at Priest Rapids. There has been no work on this project in recent years.

References: 3d annual report, page 609; 4th annual report, page 342; 5th annual report, page 292.

YAKIMA PROJECT EXTENSIONS.

Located in south central Washington, in Kittitas, Benton, and Yakima Counties, the proposed extensions to the Yakima project include four divisions as follows: Kittitas Division, covering 70,000 acres of land; Moxee Division, covering 40,000 acres; Roza Division, covering 60,000 acres; and Kennewick Division, covering 35,000 acres. Contracts have been entered into with the various districts for furnishing storage water and making further investigations.

Reference: 18th annual report, page 424.

WYOMING.

ALCOVA-CASPER PROJECT.

This project involves an 80-mile canal for the irrigation of 30,000 acres along the north side of the North Platte River by means of a diversion dam 50 feet high at Alcova.

References: 2d annual report, page 505; 3d annual report, page 332; 4th annual report, page 231; 6th annual report, page 138.

BIG PINEY PROJECT.

This project involves the irrigation of about 9,000 acres of irrigable land west of Green River in Lincoln County, by diversion from the north channel of the Green River.

References: 15th annual report, page 543; 18th annual report, page 427.

BONNEVILLE PROJECT.

This project involves an area of about 200,000 acres lying east of the Green River and west of Big Sandy Creek. The water supply would be obtained by diversion from Green River and New Fork River, with storage in Green, Fremont, Half Moon, and Boulder Lakes. An investigation was made by G. Stubblefield in 1918 and 1919 from which the conclusion was reached that the various Green River projects were not feasible under conditions then existing.

Reference: 18th annual report, page 427.

CASPER-DOUGLAS PROJECT.

This project was investigated in 1903 and 1904 and involves a diversion dam at a point about 8 miles above Casper, with canals on both the north and south sides of the North Platte River. The area covered would be about 25,000 acres on the north side and about 20,000 acres on the south. Some recent studies have been made of areas in this district in connection with the North Platte cooperative investigations.

References: 2d annual report, page 505; 3d annual report, page 333; 4th annual report, page 232; 17th annual report, page 387; 18th annual report, page 424; 19th annual report, page 431.

CHURCH BUTTES PROJECT.

This project covers a gross area of 70,000 acres in Uinta, Lincoln, and Sweetwater Counties, of which 25,000 are believed to be irrigable. The water supply is proposed to be secured from Black and Henry Forks of the Green River, with storage in the proposed Basin Reservoir site in Utah.

Reference: 18th annual report, page 425.

FIFTEEN MILE PROJECT.

This project is located in the north-central part of Wyoming, in Big Horn and Washakie Counties, and proposes the irrigation of some 60,000 acres of land along Gooseberry and Fifteen Mile Creeks. These streams have an insufficient supply for the lands it is proposed to

irrigate and the plan contemplates diversion from Wood River, a tributary of Greybull River, with storage in Little Buffalo Basin Reservoir site. The Greybull River water supply is largely appropriated; also the water users of the Greybull Valley are proposing organization of an irrigation district for the purpose of building storage reservoirs which would probably leave the Fifteen Mile project without a supplemental water supply. The Little Buffalo Basin Reservoir site is now a producing oil field.

Reference: 19th annual report, page 430.

LAKE DE SMET PROJECT.

This proposed project is located in north-central Wyoming, in Johnson County. Lake DeSmet is formed by a natural basin in the comparatively low, rolling country east of the Big Horn Mountains at an elevation of about 4,500 feet above sea level. The lake has no visible outlet. The storage capacity of the proposed reservoir is about 55,000 acre-feet, an amount sufficient to regulate the flow of Piney Creek, which is regarded as the most feasible way of utilizing Lake DeSmet for irrigation purposes. Several alternative plans have been considered, but as all of the irrigable land tributary to Lake DeSmet is in private ownership, and as the water of Piney Creek has been appropriated, it was thought advisable to give the landowners an opportunity to increase their supply. Therefore the area withdrawn for investigation was restored to entry by Secretary's order dated June 9, 1906. The project was first examined by Capt. H. M. Chittenden in 1897, his report being published as House Document No. 141, 55th Congress, 2d session. No recent work has been done on this project.

References: 1st annual report, page 307; 2d annual report, page 517; 3d annual report, page 116; 5th annual report, page 301; 6th annual report, page 276.

LYMAN PROJECT.

The Lyman project involves the irrigation of about 35,000 acres of land in Uinta County by diversion from Blacks Fork of the Green River. Investigations were made in 1918 by Engineer G. Stubblefield, from which it is concluded that there is insufficient water supply from Blacks Fork for the irrigation of any lands additional to those already under existing ditches.

Reference: 17th annual report, page 387.

NORTH PLATTE COOPERATIVE INVESTIGATIONS.

A board of engineers appointed to review the Conkling-Meeker report completed its studies and submitted report under date of September 4, 1920. Under an agreement dated April 29, 1921, Engineer Ferd Bonstedt was assigned to make an investigation of the irrigable areas on the North Platte River, including Pass Creek Flats project, Casteel project, Saratoga Encampment project, and Sierra Madre project. Work is now in progress.

References: 17th annual report, page 387; 18th annual report, page 424; 19th annual report, page 431.

OPAL PROJECT.

The Opal project covers a gross area of 70,000 acres, of which 30,000 acres are considered irrigable, in Lincoln and Sweetwater Counties. The water supply would be derived from Henry Fork, with storage on Hams Fork and Willow Creek. An investigation of Green River projects was made in 1918–1919 by the Reclamation Service, from which it was concluded that these projects were not feasible under conditions then existing.

Reference: 18th annual report, page 426.

OREGON BASIN PROJECT.

This project, located in Park and Big Horn Counties, includes an irrigable area of 90,000 acres, which could be watered from the Shoshone River, with storage in a reservoir to be constructed in the Oregon Basin. A partial supply could be obtained by direct diversion from the South Fork of the Shoshone River which might be sufficient for the irrigation of 35,000 acres, or by storing in the basin probably 50,000 acres could be supplied from this source. In 1910 surveys were made by G. E. Stratton, engineer, based on using Shoshone Reservoir water on lands in the Oregon Basin. Further investigations were made in 1918–19 by Engineer F. Bonstedt, which included surveys of the irrigable areas.

Reference: 18th annual report, page 425.

PATHFINDER PUMPING PROJECT.

This project contemplates the reclamation of lands along the North Platte River between Alcova and Douglas by pumping with power to be developed at Pathfinder Dam. The area to be irrigated consists of ten separate units on both sides of the river, aggregating about 35,000 acres. The maximum pump lift proposed is 100 feet. An investigation was made in 1915 by Engineer John F. Richardson, from which it was concluded that, depending on available capacity in the Pathfinder Reservoir, the water supply was insufficient for more than 11,000 acres of new land, and that the construction cost would probably be considerably higher than the value of water for irrigation in that section of the country.

Reference: 4th annual report, page 231.

SEEDSKADEE PROJECT.

This project is separated into two separate divisions on the west side of Green River, the Large Seedskadee, with about 65,000 acres of irrigable land proposing to divert from the Green River about 2 miles above La Barge Creek, and the Small Seedskadee, involving an irrigable area of 28,000 acres which could be supplied by a diversion near Anderson Island. An investigation was made by the Reclamation Service in 1918 and 1919, from which it was concluded that the Green River projects were not feasible under conditions then existing.

Reference: 18th annual report, page 426.

Cooperative investigations of irrigation projects made by the United States Reclamation Service to June 30, 1921.

State and project or investigation.	Contractor.	Date of agreement.	Funds furnished under agreement.			Additional expenditures by United States.	Engineer in charge.	Date of report.	Remarks.
			United States.	Contractor.	Total.				
Arizona:									
San Carlos	San Carlos Irrigation Association.	June 4, 1920	.....	$8,638.54	$8,638.54	[1] $24,829.51	Fisher	1920	
	State of Arizona	July 1, 1920							
Gila River storage	do	Jan. 9, 1920	$13,614.80	13,614.80	27,229.60	10,392.86	Schlecht	1920	Known as Arizona cooperative work.
Hualpai Wells	do	Apr. 19, 1916	1,623.62	3,961.53	5,585.15	.....	do	June 14, 1917	
Paradise Verde	Salt River Valley Water Users' Association.	Informal	.....	929.14	929.14	.....	Hamlin	June 7, 1919 Mar. 3, 1920	
California:									
Iron Canyon	Iron Canyon Association	Oct. 6, 1913	9,584.89	9,133.44	18,718.33	(2)	Whistler	Nov. —, 1914	
Do	Iron Canyon Association and State of California.	May 5, 1919	8,721.71	17,068.68	25,790.39	.....	Gault	May —, 1920	$8,346.96 by the State.
Pit River	State of California	May 27, 1914	2,499.18	2,500.00	4,999.18	(2)	Peterson	Apr. —, 1915	
Lower Pit River	Northern California Irrigation Association.	Sept. 10, 1914	2,297.37	2,297.38	4,594.75	(2)	Means	July —, 1915	Known as Shasta Co. project.
Warner Reservoir	Volcon Land & Water Co	July 12, 1920	.....	5,339.60	5,339.60	.....	Longwell	Feb. 28, 1920	
Imperial Laguna	Imperial Laguna Water Co	July 6, 1917	.....	1,543.81	1,543.81	.....	Preston	Feb. 2, 1918	
Boulder Canyon	Imperial Irrigation District	Jan. 27, 1921	43,771.81	50,000.00	93,771.81	[1] 7,547.50	Young	Pending	Work in progress. Colorado River Storage.
	Coachella Valley District	Dec. 14, 1920							
	Palo Verde Levee District	Informal							
Imperial Valley	Imperial Irrigation District	Aug. 28, 1920	14,186.69	30,000.00	44,186.69	[1] 2,794.04	Gault	do	Work in progress.
Owens Valley	City of Los Angeles	Apr. 29, 1920	.....	19,500.00	19,500.00	12,061.92	Conkling	do	Do.
Jess Valley	Modoc County Development Co.	Sept. 19, 1919	1,901.01	1,901.01	3,802.02	(2)	Gault	July —, 1920	
Honey Lake	Southern Lassen Irrigation Association.	Mar. 18, 1915	1,945.60	500.00	2,445.60	.....	Stubblefield	1916	Contractor failed to pay under agreement and work discontinued.
Colorado:									
Grand Valley drainage	Grand Valley Drainage District	Dec. 13, 1915	.....	35,383.58	35,383.58	5,041.06	Walker	Dec. 22, 1916	
Orchard Mesa	Burry Johnstone and Peters	Aug. 5, 1916	.....	4,674.32	4,674.32	689.66	Miner	May 15, 1917 Nov. 13, 1918	
Do	Orchard Mesa Irrigation District.	May 26, 1919	.....	444.13	444.13	.....	Harper	June 6, 1919	
Uncompahgre domestic water supply.	Uncompahgre Valley Water Users' Association.	Apr. 6, 1921	.....	2,500.00	2,500.00	.....	Foster	Pending	Work in progress.

[1] Under the designation of Colorado River Basin and Colorado River investigation there was expended by the United States in this connection prior to this cooperative investigation a total of $208,030.85.

[2] Under the designation of Sacramento Valley investigations there was expended by the United States in connection with these and other adjacent projects prior to these cooperative contracts a total of $43,620.72.

Cooperative investigations of irrigation projects made by the United States Reclamation Service to June 30, 1921—Continued.

State and project or investigation.	Contractor.	Date of agreement.	Funds furnished under agreement.			Additional expenditures by United States.	Engineer in charge.	Date of report.	Remarks.
			United States.	Contractor.	Total.				
Idaho:									
American Falls Reservoir.	Twin Falls Canal Co. and 24 others.	Apr. 14, 1920	$40,794.97	$33,607.00	$74,401.97	.....	Banks.....	Pending.....	Work in progress; total costs given to June 1, except right-of-way payments.
Mountain Home.....	Boise Chamber of Commerce..	May 12, 1921	10,000.00	10,000.00	20,000.00	$5,978.57	.....do.....	.....do.....	In progress; $6,000 paid in.
Montana:									
Judith Basin.....	Thos. Nicholson et al.....	Aug. 20, 1919	12.25	2,891.42	2,903.67	.....	Fisher.....	Nov. —, 1919	
Talley Lake.....	Talley Lake Irrigation District	Nov. 28, 1919	33.00	2,500.00	2,533.00	.....	Moody.....	Oct. 20, 1920	
Kalispell.....	Kalispell Chamber of Commerce.	Apr. 30, 1920	.....	100.00	100.00	.....	.....do.....	None.....	
Cut Bank.....	Cut Bank Irrigation District...	June 13, 1921	.....	3,000.00	3,000.00	.....	Snell.....	Pending.....	Work in progress; $1,000 paid in.
Nevada:									
Humboldt.....	State of Nevada.....	June 30, 1919	722.55	1,000.00	1,722.55	.....	Conkling...	Dec. —, 1919	
New Mexico:									
Middle Rio Grande.....	State of New Mexico.....	June 2, 1920	4,107.22	20,000.00	24,107.22	.....	Burkholder	Pending.....	Work in progress by State.
Pecos River.....	Carlsbad Water Users' Association.	May 2, 1921	5,000.00	5,000.00	10,000.00	7,120.71	Debler.....	.....do.....	Work in progress.
Oregon:									
Columbia River.....	State of Oregon.....	Dec. 12, 1913	17,008.51	14,976.18	31,984.69	[3] 4,810.82	Harza.....	Nov. —, 1914	
Deschutes.....	.....do.....	May 5, 1913	15,862.85	18,504.40	34,367.25	(3)	Whistler...	Dec. —, 1914	
Do.....	.....do.....	May 23, 1919	6,684.24	4,157.75	10,841.99	.....	Crosby.....	Nov. —, 1920 Feb. 28, 1921	Report on geology of Benham Falls Reservoir site.
Ochoco.....	.....do.....	May 5, 1913	3,570.30	4,241.25	7,811.55	(3)	Whistler...	June —, 1915	
Malheur.....	.....do.....	.....do.....	4,982.10	4,467.12	9,449.22	83,499.62	.....do.....	Feb. —, 1916	
Owyhee.....	.....do.....	.....do.....	1,615.74	1,197.06	2,812.80	(3)	.....do.....	Feb. —, 1916	
Do.....	.....do.....	May 17, 1921	5,000.00	5,000.00	10,000.00	1,393.53	Bond.....	Pending.....	Work in progress.
Harney.....	.....do.....	May 5, 1913	1,046.62	646.98	1,693.60	.....	Whistler...	Feb. —, 1916	
Silver Creek.....	.....do.....	.....do.....	334.23	.....	334.23	(3)	.....do.....	Feb. —, 1916	
Warner Valley.....	.....do.....	.....do.....	1,181.85	1,434.92	2,616.77	(3)	.....do.....	Feb. —, 1916	
White River.....	.....do.....	.....do.....	97.03	397.40	494.43	(3)	.....do.....	Feb. —, 1916	
Rogue River.....	.....do.....	.....do.....	1,426.96	1,844.93	3,271.89	(3)	.....do.....	Feb. —, 1916	
Willamette.....	.....do.....	.....do.....	378.20	1,036.55	1,414.75	(3)	.....do.....	Feb. —, 1916	
Silver Lake.....	.....do.....	.....do.....	3,407.03	3,017.46	6,424.49	(3)	.....do.....	Oct. —, 1915	
John Day.....	.....do.....	.....do.....	16,009.57	13,179.61	29,189.18	(3)	.....do.....	Feb. —, 1916	
Lower Powder River...	Almiral & Co.....	Informal.....	.....	5,000.00	5,000.00	.....	Fisher.....	July 8, 1920	Do.

South Dakota:									
Angostura	State of South Dakota	May 31, 1917	3,331.70	3,542.61	6,874.31	.....	Pease	1917-1918	
Texas:									
Lower Rio Grande	Lower Rio Grande Conservation Association.	Feb. 25, 1919	15,837.37	14,951.52	30,788.89	1,809.92	do	1921	
Lower Rio Grande flood control.	Lower Rio Grande Valley Chamber of Commerce.	Nov. 29, 1920	.....	10,000.00	10,000.00	.....	do	Pending	Work in progress; $5,000 paid in.
Utah:									
Castle Peak	State of Utah and Mormon Church.	Mar. 11, 1918	500.00	1,000.00	1,500.00	23,133.88	Drager	Dec. —, 1920	
Green River	Salt Lake Chamber of Commerce.	May 27, 1921	15,000.00	15,000.00	30,000.00	572.89	Green	Pending	Work in progress; $6,000 paid in.
Juab County	T. C. Winn et al.	June 10, 1919	.....	4,580.83	4,580.83	.....	Lytel	Feb. —, 1920	
Washington:									
Pasco	State of Washington	Jan. 22, 1920	2,099.49	2,000.00	4,099.49	.....	Rowe	Dec. —, 1920 Feb. 16, 1921	
Palouse	do	Nov. 18, 1913	10,201.92	9,999.70	20,201.62	76,409.01	McCulloh	Jan. 7, 1915	
Kennewick	Kennewick Irrigation District.	Sept. 24, 1919	.....	12,469.50	12,469.50	27,045.51	Crownover	Pending	Work in progress.
Yakima High Line	Yakima Benton Irrigation District.	July 6, 1920	.....	17,291.98	17,291.98	38,341.02	do	do	Do.
Selah-Moxee	Yakima Irrigation District	June 7, 1920	.....	12,245.97	12,245.97	55,694.72	do	do	Do.
Wyoming:									
Green River et al.	State of Wyoming	June 1, 1915	3,681.76	3,700.52	7,382.28	[4] 6,313.54	Richardson	Jan. —, 1916 Oct. —, 1916	
North Platte	do	Jan. 15, 1918 Sept. 23, 1920	5,868.66	5,868.66	11,737.32	.....	Conkling	Sept. 4, 1920	
Saratoga-Encampment	do	Apr. 29, 1921	5,000.00	5,000.00	10,000.00	.....	Bonstedt	Pending	Do.
Alcova-Casper	do	June 20, 1921	5,000.00	5,000.00	10,000.00	1,568.96	.....	do	Work not begun.
Total			305,942.80	489,782.28	795,725.08	687,820.64			

[3] Under the designation of central Oregon investigations there was expended by the United States prior to the Oregon cooperative contract a total of $39,128.82.

[4] Under the designation of Colorado River Basin and Colorado River investigation there was expended by the United States in this connection prior to this cooperative investigation a total of $208,030.85.

FINANCIAL STATEMENT.

Summary of general data for secondary projects to end of fiscal year 1921.

Finances:		
Appropriations—		
Fiscal year 1921—		
Amount specified in appropriation act	$50,000.00	
Amount specified in Kinkaid Act	20,000.00	
Increase under 10 per cent provision	5,000.00	
Unencumbered balance of previous appropriations	17,185.40	
Miscellaneous collections and transfers issued	182,738.16	
Increase of compensation	11,468.40	
Total amount authorized		$286,391.96
Encumbrances—		
Disbursements and transfers received	$229,683.40	
Current liabilities	6,500.53	
Contingent liabilities	250.00	
Increase of compensation	11,468.40	
Total encumbrances		247,902.33
Unencumbered balance as of July 1, 1921		38,489.63
Fiscal year 1922—		
Amount specified in appropriation act		100,000.00
Fiscal year 1923—		
Proposed appropriation		100,000.00
Inventories:		
Value of stock on hand		3,473.63
Value of plant and equipment in use		3,307.05
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$1,391,375.94	
Less revenues and adjustments	933.39	
Net cost to June 30, 1921		1,390,442.55

Condensed financial statement, secondary projects, June 30, 1921.[1]

DEBITS.

Inventory of materials and supplies on hand		3,473.63
Plant and equipment in use		3,307.05
Current accounts receivable		45,069.01
Unearned value of contracts		250.00
Construction cost of works	$1,391,375.94	
Less revenues and adjustments during construction period	933.39	
Net construction cost		1,390,442.55
Investment items in transit		9,154.97
Total debits		1,451,697.21

CREDITS.

Current accounts payable			3,579.15
Contingent and deferred liabilities			250.00
Resources for repaying cost of project			161,428.84
Revenues held in reserve			138,531.05
Investment:			
Disbursements and transfers from other projects	$1,585,132.57		
Items in transit	1,747.68		
Total		$1,586,880.25	
Less collections and transfers to other projects	$446,379.37		
Items in transit	[2] 7,407.29		
Total		438,972.08	
Net investment			1,147,908.17
Total credits			1,451,697.21

Status of returns to the reclamation fund on account of construction contracts and charges for operation and maintenance, and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected, cash.	Uncollected.
Rentals, grazing, and farming lands	$138,531.05	$118,789.83	$19,741.22
Contractors' freight refunds	466.70	466.70	
Miscellaneous	25,329.29	1.50	25,327.79
Total	164,327.04	119,258.03	45,069.01

[1] Does not include Boulder Canyon, or Imperial Valley.

[2] Contra.

Cost of secondary projects.

Projects.	Fiscal year 1921.	To June 30, 1921.
Arizona:		
Arizona cooperative	$8,099.37	$20,049.17
Arizona well drilling		3,536.33
Parker		517.91
San Carlos distribution	8,184.69	8,638.54
Little Colorado		9,554.33
San Carlos		24,829.51
San Pedro		2,427.34
Paradise-Verde		929.14
Total, Arizona	16,284.06	70,482.27
Arizona-California:		
Colorado River Basin	64.90	164,320.85
Colorado River		43,710.00
Total, Arizona-California	64.90	208,030.85
California:		
Owens Valley	15,112.18	29,163.54
Imperial Laguna		1,543.81
Imperial Valley		2,794.04
Iron Canyon	48.96	36,161.76
Jess Valley	[1] 3.72	3,802.02
Kings River storage		1,157.70
Lassen County		2,445.60
Turlock-Modesto		278.97
Oakdale-South San Joaquin		1,079.16
Putah Creek		211.32
Pitt River cooperative		2,499.18
Sacramento Valley		43,620.72
San Joaquin		3,531.20
San Luis Rey		698.53
San Ysidro		7.50
Shasta County cooperative		4,594.75
Warners Ranch Reservoir	[1] 58.55	5,319.80
Woodbridge		180.47
Total, California	15,098.87	139,090.07
Colorado:		
Dolores		4,256.27
White River		4,357.00
Little Snake River		951.43
Montezuma		4,918.10
San Luis Valley		4,318.01
Total, Colorado		18,800.81
Idaho:		
Idaho investigations		1,327.25
Island Park		4,774.53
Mountain Home		5,978.57
Snake River Basin	[1] 44,448.01	
Swan Valley		544.88
Dubois		17,252.06
Port Neuf		2,168.01
General investigations		1,191.78
Total, Idaho	[1] 44,448.01	33,237.08
Montana-North Dakota: Surveys	9,296.90	9,296.90
Montana:		
Clarks Fork	604.09	6,821.33
Crow Reservation		18,911.96
Judith Basin		2,903.67
Lake Basin		7,103.26
Little Bitter Root	165.70	2,208.73
Madison River		10,729.09
Marias		13,546.39
Missoula-Huson		3,077.14
Vicinity of Toston		544.58
Kalispell	73.29	73.29
Total, Montana	843.08	65,919.44
Nebraska:		
Nebraska investigations		3,381.70
South Platte		2,877.01
Total, Nebraska		6,258.71

[1] Contra.

Cost of secondary projects—Continued.

Projects.	Fiscal year 1921.	To June 30, 1921.
Nevada:		
Humboldt River	$[1] 1.50	$722.55
Walker River		13,696.37
Total, Nevada	[1] 1.50	14,418.92
New Mexico:		
Middle Rio Grande	8.03	4,107.22
La Plata		28,064.33
Las Vegas		5,014.09
Urton Lake		17,464.70
Pecos Valley	1,665.93	1,665.93
Total, New Mexico	1,673.96	56,316.27
North Dakota:		
Bismarck		13,621.69
Bowman		4,025.03
Little Missouri		11,933.52
Washburn		10,532.73
Nesson		17,471.83
Total, North Dakota		57,584.80
Oklahoma:		
Lawton		13,774.82
Turkey Creek		137.30
Cimarron		8,891.17
Oklahoma reconnaissance		400.00
Red River		60,209.27
Total, Oklahoma		83,412.56
Oregon:		
Central Oregon		39,128.82
Columbia River cooperative		17,008.51
John Day		16,009.57
Deschutes	2,437.17	23,581.49
Harney		1,046.62
Klamath River investigations		347.39
Lower Powder River	705.68	1,420.49
Malheur		88,472.72
Ochoco-Crooked River		3,570.30
Owyhee	711.90	3,571.64
Rogue River		1,426.96
Silver Creek		334.23
Silver Lake		3,407.03
Warner Valley		1,181.85
White River		97.03
Willamette Valley		378.20
Teel District		456.35
General investigations		226.43
Total, Oregon	3,854.75	201,665.63
South Dakota: Angostura		6,874.31
Texas:		
Cotulla		110.00
Lower Rio Grande (irrigation)	7,463.39	32,598.81
Lower Rio Grande (flood control)	6,511.58	6,511.58
Pecos River survey		7,120.71
Total, Texas	13,974.97	46,341.10
Utah:		
Castle Peak	9,414.51	24,641.64
Dixie Reservoir		863.52
Utah reconnaissance		632.59
Mammoth Reservoir		404.27
Price River		17.73
Green River water-right investigations		252.74
Bear Lake		18,827.72
Provo-Webber		141.35
Utah Lake		34,019.30
Juab investigations	4,196.68	4,196.68
Green River	2,388.07	2,388.07
Total, Utah	15,999.26	86,415.61

[1] Contra.

Cost of secondary projects—Continued.

Projects.	Fiscal year 1921.	To June 30, 1921.
Washington:		
Benton		$11,167.45
Columbia River investigations	$3,753.24	5,057.72
Kittitas		19,366.90
Lower Snake River, Pasco	1,061.86	2,099.49
Methow-Okanogan		192.14
Palouse		76,409.01
Palouse cooperative		10,201.92
Wapato		36,465.77
Priest Rapids		6,216.01
Total, Washington	4,815.10	167,176.41
Wyoming:		
Pathfinder pumping		1,568.96
Church Butte		1,442.28
DeSmet		8,917.38
Fifteen Mile		125.06
Green River		820.15
Lyman		2,477.77
North Platte cooperative	1,161.75	5,846.88
Wyoming cooperative		3,681.76
Saratoga-Encampment	1,043.48	1,043.48
General investigations		2,073.34
Total, Wyoming	2,205.23	27,497.06
Miscellaneous:		
General reconnaissance	[1] 7.38	6,182.31
Miscellaneous investigations	580.88	5,669.32
Preliminary investigations		80,488.73
Experimental investigations	216.78	216.78
Total, miscellaneous	790.28	92,557.14
Grand total	40,451.85	1,391,375.94
Less revenues earned:		
Contractor's freight refunds		466.70
Hospital profit	154.07	465.19
Miscellaneous	1.50	1.50
Total	155.57	933.39
Net cost	40,296.28	1,390,442.55

[1] Credit.

General expense, secondary projects.

Office.	Fiscal year 1921.	To June 30, 1921.
Washington office	$1,883.28	$12,279.36
Project office	3,452.39	184,076.83
Denver office	1,132.77	18,812.16
District counsel's office	170.06	1,047.69
Other offices and miscellaneous		3,846.44
Total	6,638.50	220,062.48
Percentage of general expense to gross costs	7.3	15.8

Condensed financial statement, Boulder Canyon investigations, June 30, 1921.

DEBITS.

Inventory of materials and supplies on hand		$215.45
Plant and equipment in use		16,783.54
Construction cost of works	$77,219.31	
Less revenues and adjustment during construction period	446.49	
Net construction cost		76,772.82
Investment items in transit		1,070.31
Total debits		94,842.12

CREDITS.

Current accounts payable			$2,467.74
Resources for repaying cost of project			50,000.00
Investment:			
Disbursements and other projects	$102,174.55		
Items in transit	1,145.31		
Total		$103,319.86	
Less collections and transfers to other projects	60,870.48		
Items in transit	75.00		
Total		60,945.48	
Net investment			42,374.38
Total credits			94,842.12

Construction cost and revenue for fiscal year 1921 and total to June 30, 1921, Boulder Canyon investigations.

Features.	Fiscal year, 1921.	To June 30, 1921.
Examination and surveys, whole project	$77,219.31	$77,219.31
Total cost of construction features	77,219.31	77,219.31
Less revenues earned during construction period:		
Profit on hospital operations	343.29	343.29
Miscellaneous	103.20	103.20
Total revenues	446.49	446.49
Net construction cost to June 30, 1921	76,772.82	76,772.82

Cost of construction, by calendar and fiscal years, Boulder Canyon investigations.

Year ending Dec. 31, 1920	$20,987.36
January to June, 1921	56,231.95
Total	77,219.31

General expense, Boulder Canyon investigation.

Office.	Fiscal year 1921.	To June 30, 1921.
Washington office	$1,264.11	$1,264.11
Project office	3,754.71	3,754.71
Denver office	1,114.25	1,114.25
District counsel's office	2.05	2.05
Total	6,135.12	6,135.12
Percentage of general expense to gross cost	7.9	7.9

Summary of general data for Imperial Valley investigations.

Finances:		
Appropriations fiscal year 1921—		
Amount specified in appropriation act May 18, 1920 ($20,000, less $5,000 for account Boulder Canyon)		$15,000.00
Miscellaneous collections		45,650.85
Transfers to other projects		16,385.56
Increase of compensation		2,812.60
Total amount authorized		79,849.01
Encumbrances—		
Disbursements	$39,020.30	
Transfers from other projects	28,223.71	
Current liabilities	493.76	
Increase of compensation	2,812.60	
Total encumbrance		70,550.37
Unencumbered balance July 1, 1922		9,298.64
Amount allotted		62,000.00
Value of resources to repay net cost of construction		30,000.00

Condensed financial statement, Imperial Valley investigations, June 30, 1921.

DEBITS.		
Inventory of materials and supplies on hand		[1] $10.91
Construction cost of works	$38,260.17	
Less revenues and adjustments during construction period	111.50	
Net construction		38,148.67
Total debits		38,137.76
CREDITS.		
Current accounts payable		493.76
Resources for paying construction cost of project		30,000.00
Investment:		
Disbursements and transfers from other projects	$70,056.61	
Less collections and transfers to other projects	62,412.61	
Net investment		7,644.00
Total credits		38,137.76

General expense, Imperial Valley investigations.

Office.	Fiscal year 1921.	To June 30, 1921.
Washington office	$991.50	$991.50
Denver office	391.02	391.02
Project office	5,102.25	5,102.25
Total	6,484.77	6,484.77
Percentage of general expense to gross cost	0.169	0.169

Summary of general data for Deschutes project.

Finances:		
Appropriation, fiscal year 1922—		
Amount specified in appropriation act		$400,000.00
Encumbrances—		
Disbursements and transfers received	$2,100.07	
Current liabilities	319.04	
Total encumbrance		2,419.11
Unencumbered balance as of July 1, 1921		397,580.89

Condensed financial statement, Deschutes project, June 30, 1921.

DEBITS.		
Construction cost of works	$2,363.87	
Less revenues and adjustments during construction period	3.00	
Net construction cost		$2,360.87
Total debits		2,360.87
CREDITS.		
Current accounts payable		319.04
Investment: Disbursements and transfers from other projects		2,041.83
Total credits		2,360.87

Construction cost and revenue for fiscal year 1921 and total to June 30, 1921, Deschutes project.

Features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys (whole project)	$2,363.87	$2,363.87
Total cost of construction features	2,363.87	2,363.87
Less revenues earned during construction period: Profit on hospital operations	3.00	3.00
Net construction cost, June 30, 1921	2,360.87	2,360.87

[1] Contra.

Cost of construction, by calendar and fiscal years, Deschutes project.

January to June, 1921	$2,363.87
Year ending June 30, 1921	2,363.87

FINANCIAL STATEMENT, GENERAL OFFICES, ETC.

Condensed financial statement, Washington office, June 30, 1921.

DEBITS.

Collections on hand and in special deposit			$1,104.83
Inventory of materials and supplies on hand			37,829.57
Plant and equipment in use			17,069.20
Current accounts receivable			5,711.60
Unearned value of contracts			21,542.62
Construction cost of works		$4,074.74	
Less revenues and adjustments during construction period		776.10	
Net construction cost			3,298.64
Items in transit			24,326.63
Total debits			110,883.09

CREDIT.

Current accounts payable			6,972.33
Contingent and deferred liabilities			22,647.45
Investment:			
Disbursements and transfers from other projects	$4,736,108.63		
Items in transit	1,489.76		
		$4,737,598.39	
Less collections and transfers to other projects	4,679,171.95		
Items in transit	[1] 22,836.87		
Total		4,656,335.08	
Net investment			81,263.31
Total credits			110,883.09

Condensed financial statement, Denver office, June 30, 1921.

DEBITS.

Inventory of materials and supplies on hand			$12,634.42
Plant and equipment in use			23,432.07
Current accounts receivable			14,026.04
Construction cost of works		$40,091.65	
Revenues and adjustments during construction period		[1] 2,092.94	
Net construction cost			42,184.59
Investment items in transit			2,139.46
Total debits			94,416.58

CREDIT.

Current accounts payable			8,229.31
Investment:			
Disbursements and transfers from other projects	$1,443,532.49		
Items in transit	2,137.26		
Total		1,445,669.75	
Less collections and transfers to other projects	1,359,484.68		
Items in transit	[1] 2.20		
Total		1,359,482.48	
Net investment			86,187.27
Total credits			94,416.58

Condensed financial statement, drainage and cut-over investigations, June 30, 1921.

DEBIT.

Construction cost of works			$100,534.50

CREDIT.

Current accounts payable			11.49
Investment:			
Disbursements		$100,987.52	
Less collections		464.51	
Net investment			100,523.01
Total credits			100,534.50

[1] Contra.

Condensed financial statement, Garden City project, June 30, 1921.

DEBITS.

Deferred accounts receivable		$785.00
Construction cost of works	$342,963.58	
Operation and maintenance during construction	52,868.20	
Gross construction cost	395,831.78	
Less revenues	10,180.71	
Net construction cost		385,651.07
Total debits		386,436.07

CREDITS.

Resources for repayment cost of project		53,074.41
Investment:		
Disbursements and transfers from other projects	$402,424.80	
Less collections and transfer to other projects	69,063.14	
Net investment		333,361.66
Total credits		386,436.07

Condensed financial statement, Hondo project, June 30, 1921.

DEBITS.

Current accounts receivable		$35.49
Construction cost of works	$339,491.68	
Operation and maintenance during construction	42,081.71	
Gross construction cost	381,573.39	
Less revenues and adjustments during construction period	9,706.22	
Net construction cost		371,867.17
Total debits		371,902.66

CREDITS.

Investment:		
Disbursements and transfers from other projects	$407,745.12	
Less collections and transfers to other projects	35,842.46	
Net investment		371,902.66
Total credits		371,902.66

INDIAN IRRIGATION PROJECTS.

MONTANA, BLACKFEET (INDIAN) PROJECT.

R. M. Snell, project manager, Browning, Mont.

LOCATION.

Counties: Glacier and Pondera.

Townships: 31 to 34 N., Rs. 5 to 10 W.; 29 N., R. 8 W.; 30 N., Rs. 6 to 9 W.; and 35 N., Rs. 6 and 7 W., Montana meridian.

Railroad: Great Northern.

Project towns and estimated population June 30, 1921: Browning, 1,000; Blackfoot, 50; Cutbank, 1,200; and Valier, 800.

WATER SUPPLY.

Source of water supply: Two Medicine River, Cutbank, Badger, Birch, Whitetail, and Blacktail Creeks.

Area of drainage basins: 1,700 square miles.

Annual run-off in acre-feet: Cutbank Creek at Cutbank (971 square miles), 1906 to 1919, maximum 391,600, minimum 63,930, mean 140,400. The records for Cutbank Creek for 1920 season are incomplete. Two Medicine River at Family (368 square miles), 1908 to 1920, maximum 411,940, minimum 176,100, mean 270,198. (The records for Cutbank Creek and Two Medicine River are for the years ending September 30, and do not generally include the run-off during the winter months.) Badger Creek near Family (224 square miles), 1907 to 1920. Records for this creek are incomplete. The maximum on record is 204,090 and the average for 9 years, when the most nearly complete records were kept, is 152,798. Birch Creek at Dupuyer (155 square miles), 1907 to 1915, mean 106,250.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which Service is prepared to furnish water, season of 1921: 21,500 acres.

Area under water-rental applications, season of 1920: 9,937 acres.

Length of irrigation season: May 1 to September 30, 153 days.

Average elevation of irrigable area: 3,850 feet above sea level.

Rainfall on irrigable area: 1909 to 1920, average 12.5 inches; 1920, 7.13 inches.

Temperature on irrigable area: Average of highest recorded temperature, 1914 to 1920, 90.5° F.; average of lowest recorded temperature, 1914 to 1920, −35° F.

Character of soil of irrigable area: Principally rich sandy loam; some gravelly loam and gumbo.

Principal products: Hay, grain, and vegetables.

Principal markets: Great Northern Railway towns from St. Paul to the Pacific coast. Local demand for forage crops.

LANDS OPENED TO IRRIGATION.

No lands have been opened to irrigation by public notice. Nearly all lands covered by canals are allotted to Indians. Part of the lands for which patents in fee have been issued have been sold to whites.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys made in 1907.

Construction work on the Two Medicine unit begun in July, 1908.

Construction of Two Medicine Lake Dam begun in June, 1911; completed August, 1913.

Construction of the Badger-Fisher Division begun in June, 1911.

Construction of Birch Creek Division begun in August, 1915

Two Medicine Division, 33 per cent completed June 30, 1921.

Badger-Fisher Division, 53 per cent completed June 30, 1921.

Piegan Division, 70 per cent completed June 30, 1921.
Birch Creek Division, 73 per cent completed June 30, 1921.
Entire project, 31 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Blackfeet project provides for six irrigation systems on the Blackfeet Indian Reservation, as follows: (1) The Cutbank north canal system heading on the left bank of Cutbank Creek and supplying water for 9,000 acres of land north and east of the creek; (2) the Cutbank south canal system heading on the right bank of Cutbank Creek and supplying water for 18,000 acres of land near Carlow and Seville stations on the Great Northern Railway; (3) the Two Medicine Canal systems, diverting from the left bank of the Two Medicine River and supplying water through the North Branch Canal, the Spring Lake Reservoir, and the South Branch Canal to 44,000 acres of land; (4) the Badger-Fisher Canal system, diverting water from the right bank of Badger Creek, supplying water through the Four Horns supply canal and reservoir and the Fisher Canal to 30,000 acres of land between Badger and Birch Creeks; (5) the Piegan system, diverting water from the right bank of Badger Creek direct to 3,000 acres of land on Piegan Flats; and (6) the Birch Creek Canal system, diverting from the left bank of Birch Creek and supplying water to 3,500 acres of land between Birch and Blacktail Creeks. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The irrigable lands of the project are located, in general, in the southeastern portion of the Blackfeet Indian Reservation adjacent to the north bank of Cutbank Creek and between Cutbank Creek and Birch Creek. Of the above irrigation plan the first development of the Two Medicine Canal system has been completed, including a 100 second-foot capacity main canal, with headworks and other structures and a distribution system with structures to deliver water to approximately 24,000 acres. A storage reservoir has been constructed at Lower Two Medicine Lake, to furnish a maximum storage of 16,000 acre-feet of water for this division. The amount that can be irrigated under this system is limited by the capacity of the main canal. On the Badger-Fisher Division a supply canal 12 miles long, diverting water from Badger Creek to Four Horns Reservoir, has been completed to 100 second-feet capacity. Temporary controlling works at Four Horns Lake have been completed, making available a reservoir of 4,000 acre-feet capacity.

Fisher Canal has been completed, both as to excavation and structures, to 220 second-feet capacity. Excavation of a lateral system has been completed to cover approximately 18,000 acres of allotted land on Fisher Flats. The larger structures and part of the smaller ones on this lateral system have been completed, and the remainder of the smaller ones will be built as needed. On the Piegan Division a canal and lateral system have been constructed with the exception of small lateral extensions and minor structures, to reach approximately 3,000 acres of land on Piegan Flats. On the Birch Creek Division the canal and main lateral have been completed as to excavation to irrigate 2,600 acres. The larger structures of this system have been completed, and the smaller ones will be built as needed.

Work for the immediate future includes the building of small structures on the Fisher, Two Medicine, and Birch Creek systems as needed to reach lands being brought under irrigation.

SUMMARY OF GENERAL DATA FOR BLACKFEET (INDIAN) PROJECT TO END OF FISCAL YEAR 1921.

Areas:	
Irrigable acreage when project is completed	107,500
Indian land, June 30, 1921	107,500
Acreage Service could have supplied, season of 1920	[1] 21,500
Estimated acreage Service can supply, season of 1921	[1] 21,500
Estimated acreage Service can supply, season of 1922	[1] 21,500
Acreage irrigated, season of 1920	9,937
Acreage cropped under irrigation, season of 1920	9,857
Acreage dry farmed, season of 1920	5,266
Crops:	
Value of irrigated crops, season of 1920	$243,418.00
Value of irrigated crops per acre cropped	25.00
Value of dry-farmed crops, season of 1920	106,931.00
Value of dry-farmed crops per acre cropped	20.00

[1] The 21,500 acres given in the area which can be supplied through canals as now constructed. Lateral systems are complete except for minor structures and lateral extensions to reach 48,240 acres.

Finances:		
Appropriation—		
Fiscal year 1921—		
Amount specified in appropriation act	$25,000.00	
Unencumbered balance previous appropriations	16,331.68	
Miscellaneous collections	4,701.65	
Increase of compensation	2,617.66	
Total amount authorized		$48,650.99
Encumbrances—		
Disbursements	37,314.51	
Current liabilities	4,628.08	
Contingent liabilities		
Increase of compensation	2,617.66	
Total encumbrances		44,560.25
Unencumbered balance July 1, 1921		4.090.74
Fiscal year 1922—		
Amount specified in appropriation act	$30,000.00	
Estimated amount available for allotment and expenditure		30,000.00
Inventories:		
Value of stock on hand		5,393.48
Value of plant and equipment in use		24,284.81
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$1,137,393.89	
Less revenues and adjustments	19,839 81	
Net cost to June 30, 1921		1,117,554.08
Per cent completed on June 30, 1921	31	
Estimated per cent completed on June 30, 1922	31	
Value of construction, water-right contracts, and other resources to repay net cost of project.		4,246.50
Revenues held in reserve		1.42

Status of returns to the Indian fund on account of construction and various classes of revenue as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Discount.	Total.	
Construction charges	$4,247.92	$517.17		$517.17	$3,730.75
Operation and maintenance charges (public notice)					
Supplemental construction to be paid as operation and maintenance					
Rentals, irrigation water	16,887.75	9,738.14	$108.11	9,846.25	7,041.50
Rentals, power					
Rentals, grazing and farming lands					
Contractors' freight refunds	65.83	54.81		54.81	11.02
Miscellaneous	13,349.62	13,120.50		13,120.50	229.12
Total	34,551.12	23,430.62	108.11	23,538.73	11,012.39

CONSTRUCTION DURING FISCAL YEAR.

Two Medicine Division.—During the fall of 1920 a drag-line excavator was operated on the enlargement of the Two Medicine Canal, and during the spring of 1921 such minor timber structures were placed as were necessary for the successful operation of the system.

Badger-Fisher Division.—Minor timber structures were placed on the lateral system as were required to deliver water to lands being brought under irrigation.

OPERATION AND MAINTENANCE.

The Two Medicine Badger-Fisher, Piegan, and Birch Creek Divisions were operated during the 1920 season. Water was delivered on a water-rental basis. A minimum charge of $1 was made for each acre irrigated, entitling the water user to 1½ acre-feet per acre. The demand for water was greater than ever before and due to a serious break in the Two Medicine Canal on July 2 the demand ex-

ceeded the capacity of this canal. The water supply was ample to satisfy the demands on the other systems.

The season was favorable for the growth of irrigated crops so that results, where proper irrigation and farming methods were practiced, were very satisfactory.

Historical review, Blackfeet project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which the Service was prepared to furnish water	10,000	20,000	21,500	21,500	21,500	[1] 21,500
Acreage irrigated	1,618	2,102	2,448	3,484	9,767	9,937
Miles of canal operated	65	109	125	152	199	192
Water diverted (acre-feet)	8,254	7,036	21,284	22,324	38,319	22,133
Water delivered to land (acre-feet)	2,970	1,735	2,663	6,205	14,000	8,955
Per acre of land irrigated (acre-feet)	1.83	.83	1.08	1.88	1.43	.90

[1] The 21,500 acres reported here is the amount that can be supplied through canals now constructed. Later systems are complete, except for minor structures and lateral extensions, to reach 48,240 acres.

SETTLEMENT.

Lands under the project have not been opened for settlement. About 57,500 acres have been definitely allotted to Indians, and the remainder has been tentatively allotted to Indians, except about 250 acres allotted to the Holy Family Mission (Catholic), 40 acres held by the Indian Service as a demonstration farm, and 8 operation and maintenance camp sites comprising about 200 acres held by the Reclamation Service. The allottees generally have not settled on their allotments nor farmed them. Several large tracts are being farmed by white renters and a good many allotments are being sold to white men who cultivate them.

Settlement data, Blackfeet project, by calendar years.

Item.	1914	1915	1916	1917	1918	1919	1920
Total number of farms on project	3,000	3,000	3,000	3,000	3,000	2,900	2,900
Number of irrigated farms	12	18	79	91	125	329	351
Operated by owners or managers	12	16	79	84	76	95	[1] 151
Operated by tenants		2		7	49	234	[1] 251
Population	40	50	170	180	229	299	319
Number of towns	4	4	4	4	4	4	4
Population	300	375	1,750	1,900	2,000	3,350	3,000
Total population in towns and on farms	340	425	1,920	2,070	2,229	3,649	3,319
Number of schools	1	1	5	3	4	6	6
Number of churches	2	3	8	8	8	8	8
Number of banks			3	4	4	6	5
Capital stock							$130,000
Deposits							$851,600
Depositors							2,257

[1] Estimated. The exact number is not known, as a good many tracts have been sold that have not been reported or recorded in the county records.

PRINCIPAL CROPS.

As in previous years wheat, flax, oats, and hay were the principal crops irrigated. Garden truck, including potatoes, was not raised in sufficient quantity to meet the local demand, although excellent crops were reported in some cases. The yields in 1920 were on the whole satisfactory where proper irrigation and farming methods were practiced, but owing to the low crop prices most of the water users claim to have suffered a loss on their season's operations.

Crop report, Blackfeet (Indian) project, Montana.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	185	Ton	344	1.9	$15.00	$5,160	$28
Barley	8	...do	10	1.1	12.50	125	16
	38	Bushel	1,054	27.7	1.00	1,054	28
Flax	2,207	...do	25,087	11.4	1.35	33,866	15
Garden	17			202.0		4,080	240
Hay	549	Ton	473	.9	12.50	5,915	11
Oats	150	...do	176	1.2	12.50	2,200	15
	407	Bushel	17,333	42.6	.65	11,125	27
Pasture	467			10.0		4,670	10
Potatoes	22	Bushel	3,003	136.5	1.20	3,604	164
Rye	18	Ton	18	1.0	12.50	225	12
Wheat	15	...do	30	2.0	12.50	375	25
	5,774	Bushel	132,015	22.9	1.30	171,019	30
Total cropped	9,857	Total and average				243,418	25
Fall irrigated	80						
Total irrigated	9,937						

Areas.	Acres.	Farms.	Per cent of project
Total irrigable area farms reported	19,587	351	40.6
Total irrigated area farms reported	9,937	351	20.6
Total cropped area farms reported	9,857	350	20.4

PUBLIC NOTICE AND ORDER.

RULES AND REGULATIONS REQUIRING PARTIAL PAYMENTS ON CONSTRUCTION COST, NOVEMBER 29, 1920.

1. **Act of February 14, 1920.**—The Indian appropriation act of February 14, 1920 (41 Stat., 409), directs the Secretary of the Interior to require all owners of irrigable lands under any irrigation system heretofore or hereafter constructed for the benefit of the Indians, to which land water for irrigation purposes can be delivered, to begin partial reimbursement of the construction cost, at such time and in such amounts as the Secretary may deem best; all payments to be credited on a per-acre basis in favor of the land in behalf of which such payments shall have been made, and to be deducted from the total per-acre charge assessable against said land.

2. **Definition of "owners" and "users of water."**—The words "owners" and "users of water" as used in said act are construed to include any person, Indian or white, or any firm, partnership, corporation, association, or other organization, to which title to the land to which water for irrigation purposes can be delivered, has passed, either by fee or trust, patent or otherwise, and also any entryman or allottee of such land.

3. **Lands subject to partial payments for the year 1920.**—The lands under the Blackfeet project hereby made subject to partial payments for the year 1920 are those lands to which the United States delivered water during the irrigation season of 1920.

4. **Amount of payments required.**—Construction charges have not yet been determined or announced for said project. For the year 1920, each acre of the lands described in paragraph 3 shall be subject to a charge of 50 cents. These charges shall be paid by the owner of

the land to the special fiscal agent, United States Reclamation Service, Browning, Mont.: *Provided*, That as to lands of Indian allottees for which patent in fee has not issued, the charges shall be paid to said fiscal agent through the Bureau of Indian Affairs. The charges shall be due and payable on December 1, 1920, and to all charges not paid on March 1, next following the due date, there shall be added a penalty of 1 per cent thereof, and a like penalty of 1 per cent on the first day of each month thereafter, so long as such default shall continue, and no water shall be delivered to land for which such charges and penalties are unpaid, one year or more after the due date. All principal sums so paid will be credited upon the construction charge per irrigable acre, hereafter to be announced by public notice.

5. **Land subject to partial payments for the year 1921.**—The lands for which water can be delivered for irrigation purposes during the irrigation season of 1921 which shall be subject to the above-mentioned charge, will be shown upon plats to be filed at a later date in the respective offices of the Indian Service and the Reclamation Service at Browning, Mont., and in the local land office located at Havre, Mont.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Blackfeet (Indian) project, Montana, June 30, 1921.

DEBITS.		
Collections on hand and in special deposits		$932.80
Inventory of materials and supplies on hand		5,383.48
Plant and equipment in use		24,284.81
Current Accounts receivable		11,012.39
Unearned value of contracts		56.00
Construction cost of works	$1,012,933.72	
Operation and maintenance during construction	124,424.03	
Unadjusted clearing accounts	36.14	
Gross construction cost	1,137,393.89	
Less revenues and adjustments during construction period	19,839.81	
Net construction cost		1,117,554.08
Investment items in transit		[1] 674.03
Total debits		1,158,549.53
CREDITS.		
Current accounts payable		4,634.13
Contingent and deferred liabilities		932.80
Resources for repaying cost of project		4,246.50
Revenues held in reserve		1.42
Investment:		
Disbursements	$1,172,839.60	
Items in transit	[1] 1,187.83	
Total	1,171,651.77	
Less collections	$23,430.89	
Items in transit	[1] 513.80	
Total	22,917.09	
Net investment		1,148,734.68
Total credits		1,158,549.53

[1] Contra.

Construction cost and revenues, Blackfeet (Indian) project.

	Fiscal year 1921.	To June 30, 1921.
Examination and surveys	$1,253.16	$10,066.69
Storage system:		
Two Medicine Division	5,944.93	165,198.83
Spring Lake Reservoir, surveys and design		1,930.80
Badger-Creek Reservoir, surveys and design		309.07
Four Horns Reservoir, surveys and design		1,336.49
Four Horns Reservoir Dam		11,402.81
Guardipee Reservoir	[1] 21.00	576.00
Total storage system	5,923.93	180,754.00
Canal system:		
Cutbank Division, surveys and designs		1,001.64
Birch Creek Division, surveys and designs		1,652.32
Birch Creek Canal, headworks		2,197.97
Birch Creek Main Canal		8,699.48
Carlow Division, surveys and designs		619.68
Two Medicine Canal		299,481.74
Two Medicine headworks		16,683.55
Culvert under Great Northern Ry., Seville		1,450.71
Two Medicine Division, Main Canal construction	4,152.58	8,932.82
Piegan Canal headworks		1,671.83
Piegan Canal		206.40
Four Horns Supply Canal		102,053.82
Four Horns Supply Canal headworks		8,829.58
Fisher Main Canal		149,518.66
Blacktail diversion		15,240.37
Syphon, Whitetail Crossing		13,797.51
Two Medicine Canal, surveys, testing, etc	171.57	2,074.77
Total canal system	4,324.15	634,112.85
Materal system:		
Two Medicine lateral system		27,739.04
Two Medicine Division, lateral system, surveys, testing, etc	2.73	71.12
Two Medicine construction	53.40	232.31
Two Medicine structures, timber	1,078.73	3,466.44
Piegan lateral system		16,711.04
Fisher Canal lateral system		78,586.52
Fisher Canal, drop 1, north lateral, station NO	37.44	6,394.18
Fisher Canal, drop station O, lateral K	33.87	4,787.47
Fisher Canal, drop station 186, lateral K	17.04	3,541.61
Badger-Fisher laterals	306.64	1,522.51
Badger-Fisher minor structures, concrete	171.18	9,350.06
Badger-Fisher minor structures, timber	4,371.59	10,285.98
Badger-Fisher, surveys, testing, etc	2.36	61.44
Birch Creek lateral system, surveys and designs		1,031.44
Birch Creek lateral system	1,791.50	7,830.87
Birch Creek minor structures, concrete	[1] 509.29	
Birch Creek minor structures, timber	[1] 1,279.09	
Total lateral system	6,078.10	171,612.03
Permanent improvements:		
Browning to Robare road		67.43
Bridge across Badger-Creek		1,135.59
Camp site near Family		60.00
Camp site on Fisher Canal	200.82	200.82
Total permanent improvements	200.82	1,463.84
Telephone system	6,676.49	14,924.31
Operation and maintenance during construction	27,666.72	124,424.03
Total cost of construction features	52,123.37	1,137,357.75
Unadjusted clearing account	[1] 4,443.45	36.14
Gross construction cost	47,679.92	1,137,393.89
Less revenues during construction period:		
Rentals of irrigation water	9,809.11	16,779.64
Rentals of buildings		959.35
Contractors' freight refunds	11.02	65.83
Other revenues, unclassified	36.34	854.59
Profit on hospital operations	139.93	1,131.43
Other profits on operations, unclassified		48.97
Total revenues	9,996.40	19,839.81
Net construction cost	37,683.52	1,117,554.08

[1] Contra.

Statement of cost by calendar years, Blackfeet (Indian) project.

	Construction.		
	Original.	Operation and maintenance during construction.	Total.
For the year ending Dec. 31—			
1907	$1,772.72		$1,772.72
1908	58,930.53		58,930.53
1909	107,937.25		107,937.25
1910	147,195.94		147,195.94
1911	163,616.86	$8,372.50	171,989.36
1912	185,243.92	4,696.85	189,940.77
1913	140,855.30	1,154.75	142,010.05
1914	76,630.21	4,334.33	80,964.54
1915	35,831.22	2,026.60	37,857.82
1916	11,889.58	4,836.78	16,726.36
1917	9,291.08	12,395.63	21,686.71
1918	31,423.31	13,936 66	45,359.97
1919	13,188.07	29,984.67	43,172.74
1920	19,333.29	32,501.81	51,835.10
Jan. 1 to June 30, 1921	9,830.58	10,183.45	20,014.03
Total to June 30, 1921	1,012,969.86	124,424.03	1,137,393.89

Statement of costs by fiscal years, Blackfeet (Indian) project.

	Construction.		
	Original.	Operation and maintenance during construction.	Total.
For the year ending June 30—			
1908	$9,047.80		$9,047.80
1909	86,251.96		86,251.96
1910	146,464.17		146,464.17
1911	140,737.83		140,737.83
1912	213,957.37	$1,731.57	215,688.94
1913	166,663.04	11,977.10	178,640.14
1914	132,594.42	4,088.12	136,682.54
1915	36,674.44	1,784.35	38,458.79
1916	24,066.27	4,108.95	28,175.22
1917	5,484.27	10,401.33	15,885.60
1918	1,234.79	10,582.62	11,817.41
1919	12,628.23	14,386.14	27,014.37
1920	17,152.07	37,697.13	54,849.20
1921	20,013.20	27,666.72	47,679.92
Total	1,012,969.86	124,424.03	1,137,393.89

Statement of general expense, for fiscal year 1920 and to June 30, 1921, Blackfeet (Indian) project.

Office.	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance during construction.	Total.	Construction.	Operation and maintenance during construction.	Total.
Washington office	$372.51	$691.81	$1,064.32	$35,351.35	$4,958.06	$40,309.41
Project office	961.95	1,786.48	2,748.43	89,487.90	12,550.75	102,038.65
Denver office	155.74	289.23	444.97	3,693.35	518.00	4,211.35
District counsel's office	157.05	291.67	448.72	1,650.84	231.53	1,882.37
Total	1,647.25	3,059.19	4,706.44	130,183.44	18,258.34	148,441.78
Percentage of general expense to gross cost	8.2	11.5	9.6	12.8	14.7	13.0

MONTANA, FLATHEAD (INDIAN) PROJECT.

C. J. Moody, project manager, St. Ignatius, Mont.

LOCATION.

Counties: Flathead, Missoula, Sanders.
Townships: 15 to 25 N., Rs. 17 to 25 W., Montana meridian.
Railroad: Northern Pacific.
Project cities and towns and estimated population June 30, 1921: Arlee, 200; Big Arm, 75; Camas, 100; Charlo, 75; Dayton, 48; Dixon, 150; Elmo, 12; Evaro, 100; Hot Springs, 300; Pablo, 260; Perma, 40; Polson, 2,500; Ravalli, 100; Ronan, 800; St. Ignatius, 700.

WATER SUPPLY.

Source of water supply: Jocko and Little Bitterroot Rivers; Mud, Crow, Post, Mission, Dry, Finley, Agency, Big Knife, Valley, and Falls Creeks; and about 60 smaller streams.
Area of drainage basin: 675 square miles.
Annual run-off in acre-feet of creeks, 1909 to 1920: Maximum, 473,500; minimum, 231,100; mean, 305,400.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1921: 105,500 acres.
Area under water-rental applications, season of 1921 (to June 30): 65,500 acres.
Length of irrigating season: May 1 to September 30, 153 days.
Average elevation of irrigable area: 3,000 feet above sea level.
Rainfall on irrigable area: At St. Ignatius (Mont.) station, 1909 to 1920, average, 16.67 inches; 1920, 14.92 inches. At Lone Pine (Mont.) station, 1919 to 1920, average, 9.66 inches: 1920, 10.80 inches.
Range of temperature on irrigable area, 1909 to 1920: Average of highest recorded, 96° F.; average of lowest recorded, −21° F.
Character of soil of irrigable area: Jocko Division, gravelly loam; Mission Valley Division, clay and sandy loam; Camas Division, clayey loam.
Principal products: Grain and hay.
Principal markets: Missoula, Butte, and Anaconda, Mont., and other mining and lumber towns and camps.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Proclamation of the President May 22, 1909, opened lands to filing under certain rules as to registration, etc., first filing to be May 2, 1910.
Location of lands opened: Tps. 17 to 24 N., Rs. 19 to 24 W., Montana meridian.
Limit of area of farm units: 160 acres; average irrigable, about 40 acres.
Duty of water: Average at the land in acre-feet per acre per annum, Jocko Division, 2.75; Mission Valley Division, 1.5; Camas Division, 1.25.
Building charges: Total not fixed; 50 cents per irrigable acre in 1921.
Annual operation and maintenance charges: For 1921, rental basis 75 cents per acre-foot for the Jocko Division and $1 per acre-foot for the Mission Valley and Camas Divisions.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1907.
Construction authorized and first appropriation made by act of Congress approved April 30, 1908.
Construction begun, Jocko, Mission, and Polson Divisions, 1909.
Land open to homestead entry, May, 1910.
Irrigation in Jocko and Mission Divisions begun in 1910.
Irrigation in Post Division begun in 1911.
Irrigation in Polson and Pablo Divisions begun in 1913.
Irrigation in Camas Division begun in 1919.
First construction charge imposed in 1920.
Entire project 53.1 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan of the Flathead project provides for the irrigation of about 124,500 acres of land in various parts of what was the Flathead Indian Reservation, water being diverted from creeks and rivers rising in the Mission Mountains and in the Little Bitterroot drainage area and conducted by canals directly to the land and to reservoirs for the storage of flood waters. About 8 reservoirs will be constructed, some of which are lakes whose capacity will be increased, and others natural basins which will require only the building of embankments at low points. The United States claims all waste, seepage, unappropriated spring, and percolating water rising within the project and proposes to use such water in connection therewith.

The following principal features have been completed: Two distribution systems covering approximately 12,000 acres in Jocko Valley, taking water from Jocko River and tributaries; two distribution systems covering about 9,000 acres and taking water from Mission Creek; a distribution system lying below the Pablo Feed Canal between Mission and Post Creeks, covering about 6,700 acres; a distribution system lying below Kickinghorse Dam site, covering about 5,500 acres; a distribution system lying below Ninepipe Reservoir, covering about 16,500 acres, which, together with the previous-mentioned tract, takes water from Post Creek and tributaries; a distribution system taking water directly from Post Creek, covering about 4,500 acres; a distribution system taking water from Crow Creek for about 4,700 acres in Moiese Valley; a distribution system below Pablo Reservoir, taking water from Post, Crow, and Mud Creeks for about 35,000 acres; a distribution system taking water from the last-named creeks and from Big Creek for about 2,300 acres near Polson; and distributary works from the Little Bitterroot River for 8,700 acres in the Camas Division. Six storage reservoirs have been constructed: Pablo Reservoir for 12,000 acre-feet; Ninepipe for 5,500 acre-feet; Tabor for 12,300 acre-feet; McDonald for 8,200 acre-feet; Little Bitterroot Lake for 18,000 acre-feet; and Dry Fork for 2,000 acre-feet. The Pablo Feed Canal has been built from Dry Creek to Pablo Reservoir, a distance of about 45 miles, picking up the waters of all streams flowing from the mountains.

SUMMARY OF GENERAL DATA FOR FLATHEAD (INDIAN) PROJECT TO END OF FISCAL YEAR 1921.

Areas:			
Irrigable acreage when project is complete			124,500
Public land entered to June 30, 1921		38,100	
Public land open to entry on June 30, 1921		42	
Public land withdrawn on June 30, 1921		4,907	
State land unsold June 30, 1921		4,800	
Indian land June 30, 1921		71,600	
Private land June 30, 1921		5,050	
Acreage Service could have supplied in season of 1920			98,000
Estimated acreage Service can supply in season 1921			105,500
Estimated acreage Service can supply in season 1922			110,000
Acreage irrigated season of 1920			32,836
Acreage cropped under irrigation season of 1920			31,349
Acreage dry farmed season of 1920			[1] 160,000
Crops:			
Value of irrigated crops season of 1920			$747,951.00
Value of irrigated crops per acre cropped			23.85
Value of dry-farmed crops season of 1920			800,000.00
Value of dry-farmed crops per acre cropped			5.00
Finances:			
Appropriations, without year—			
Amount specified in appropriation act (1921)		$200,000.00	
1922 appropriation available March, 1921		200,000.00	
Unexpended balance previous fiscal years—			
With U. S. Treasury	$30,664.69		
With fiscal agents	57,556.11		
		88,220.80	
Miscellaneous collections		34,666.63	
Increase of compensation		38,305.40	
Total amount authorized			561,192.83
Encumbrances—			
Disbursements		343,061.94	
Current liabilities		33,616.10	
Contingent liabilities		11,943.35	
Increase of compensation		38,305 40	
Total encumbrances			426,926.79
Unencumbered balance July 1, 1921			134,266.04

[1] 65,164 acres irrigable land dry farmed.

Inventories:		
Value of stock on hand		$59,323.00
Value of plant and equipment in use		75,922.00
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$4,083,028.11	
Less revenues and adjustments	24,354.31	
Net cost to June 30, 1921		4,058,673.80
Per cent completed on June 30, 1921	53.1	
Value of construction water-right contracts accrued and other resources to repay net cost of project		14,148.93
Revenues held in reserve		3,476.50
Operation and maintenance costs (water rentals):		
Gross cost to Dec. 31, 1920	$364,281.45	
Less charges due and miscellaneous revenues	124,301.01	
Excess		239,980.44
Drainage:		
Total cost of drainage works to June 30, 1921		53,137.76
Miles of drains built to June 30, 1921—		
Open	0.18	
Closed	2.97	
Total		3.15
Estimated acreage damaged by seepage on June 30, 1921		640
Estimated acreage protected by drains to June 30, 1921		1,240
Estimated acreage to be protected by authorized system		1,240

CONSTRUCTION DURING FISCAL YEAR.

Storage system.—Construction of McDonald Lake Dam was completed for a storage of 8,200 acre-feet with the top of the dam at elevation 3,604. Work during the fiscal year consisted of the completion of the spillway for a capacity of 4,000 second-feet and surfacing the top of the dam for a roadway. Work was begun on Dry Fork Dam and carried to completion for a storage of 2,000 acre-feet with the top of the dam at elevation 2,855.

Canal system.—The Pablo Feed Canal was completed between Mission and Post Creeks and is continuous from Dry Creek headworks to South Pablo Reservoir. Excavation of Dry Creek Canal was begun and 20,700 linear feet completed, leaving 6,600 linear feet to be excavated adjacent to Tabor Reservoir. Finishing to neat lines was completed for a distance of 1,250 feet and concrete lining placed for a distance of 100 feet, both near Cold Creek.

Lateral system.—The system in the Mission Division lying between the Pablo Feed Canal and B Lateral and known as the A system, was completed for an irrigable area of about 6,700 acres. Miscellaneous lateral extensions add about 800 acres more to the irrigable lands, making a total increase in irrigable acreage of 7,500 over the previous report.

SEEPAGE AND DRAINAGE.

There has been no change in the drainage situation in the territory contiguous to the town of Polson except for the need of extending drains to relieve about 200 additional acres.

OPERATION AND MAINTENANCE.

Although rainfall during the calendar year 1920 was below the average, there was a surplus of water and all reservoirs were partly full at the close of the irrigation season. Precipitation during the irrigation season amounted to 4.46 inches.

Land was irrigated on 1,028 farms with a total of 32,836 acres at the rate of 1.25 acre-feet of water per acre, making a total of 40,958 acre-feet delivered.

Historical review, Flathead project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water (storage incomplete)	52,400	66,000	80,300	84,300	91,000	98,000
Acreage irrigated	3,242	4,373	15,863	27,128	34,453	32,836
Miles of canal operated	201	232	364	674	741	750
Water diverted (acre-feet)	21,029	23,942	54,853	84,358	112,112	80,961
Water delivered to the land (acre-feet)	3,637	5,751	21,691	34,696	50,607	40,958
Per acre of land irrigated (acre-feet)	1.12	1.32	1.37	1.28	1.47	1.25

SETTLEMENT.

Settlement progress has been very satisfactory, especially in the Camas Division, where the completion of the Dry Fork Dam has made conditions more attractive. There were no public sales of Indian lands during the year, but private sales have been made from time to time.

Settlement data, Flathead project, by calendar years.

Item.	1916	1917	1918	1919	1920
Total number of irrigable farms	2,980	2,630	2,630	2,630	2,000
Population	14,000	14,500	14,500	14,500	[1] 15,000
Number of irrigated farms	303	567	833	850	1,028
Operated by owners or managers	219	425	670	650	799
Operated by tenants	84	142	163	200	229
Population	627	1,319	1,679	1,700	2,380
Number of towns	12	12	14	14	14
Population	3,460	4,000	4,325	5,250	5,445
Total population in towns and farms	17,460	18,500	18,825	19,750	20,445
Number of public schools	51	55	60	55	45
Number of churches	15	15	15	16	19
Number of banks	9	9	11	11	11
Total capital stock	$205,000	$205,000	$221,000	$250,000	$287,000
Amount of deposits	$745,733	$1,283,988	$1,011,177	$1,316,907	$1,457,645
Number of depositors	3,669	4,608	4,384	4,656	4,447

[1] Estimated.

CROPS AND LIVE STOCK.

Crop values were the lowest since 1917, the average being $23.85 per acre, as compared with $26.78 in 1918 and $30.06 in 1919. This decrease was due to the condition of the market following harvest.

Live-stock conditions were greatly improved over last year owing to the mildness of the winter of 1920–21 and the abundance of forage, and the past year has been the most successful in this respect in the history of the project.

Crop report, Flathead project, Montana, 1920.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	5,342	Ton	11,337	2	$15.00	$170,055	$32.00
Alfalfa seed	52	Bushel	156	3	30.00	4,680	90.00
Apples	17	Pound	19,420	1,142	.03	583	34.00
Barley	488	Bushel	7,521	15	.75	5,641	12.00
Beans	10	...do	115	11.50	2.50	258	26.00
Beets, sugar	8	Ton	38	4.75	10.00	380	48.00

Crop report, Flathead project, Montana, 1920—Continued.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Clover hay	329	Ton	433	1.33	$15.00	$6,495	$20.00
Clover seed	6	Bushel	31	5	18.00	558	93.00
Corn fodder	116	Ton	336	3	8.00	2,688	23.00
Corn, Indian	56	Bushel	1,500	27	.75	1,125	20.00
Garden	330	Ton	37,310	113	1.00	37,310	113.00
Hay	4,661	...do	5,180	1	20.00	103,600	22.00
Oats	4,062	Bushel	125,240	31	.65	81,406	20.00
Pasture	2,547	Ton	13,810	5.5	1.00	13,810	5.50
Peas	76	Bushel	841	11	3.60	3,028	40.00
Potatoes	616	...do	77,157	125	.75	57,868	94.00
Rye	94	...do	872	9	1.40	1,221	13.00
Sunflowers	24	Ton	249	10	6.00	1,494	62.00
Wheat	12,415	Bushel	169,363	14	1.50	254,045	20.00
Flax	95	...do	285	3	1.60	456	4.80
Onions	5	...do	1,000	200	1.25	1,250	250.00
Total cropped	31,349	Total and average				747,951	23.85

Irrigated, no crops:	
Young alfalfa	4,022
Miscellaneous	540
Less duplicated areas	3,075
Total irrigated	32,836

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	48,731	1,028	45
Total irrigated area farms reported	32,836	1,028	30
Under rental contracts	32,836	1,028	30
Total cropped area farms reported	31,349	1,028	29

PUBLIC NOTICE AND ORDER.

RULES AND REGULATIONS REQUIRING PARTIAL PAYMENTS ON CONSTRUCTION COSTS NOVEMBER 29, 1920.

1. **Act of February 14, 1920.**—The Indian appropriation act of February 14, 1920 (41 Stat., 409), directs the Secretary of the Interior to require all owners of irrigable lands under any irrigation system heretofore or hereafter constructed for the benefit of the Indians, to which land water for irrigation purposes can be delivered, to begin partial reimbursement of the construction cost, at such time and in such amounts as the Secretary may deem best; all payments to be credited on a per-acre basis in favor of the land in behalf of which such payments shall have been made, and to be deducted from the total per-acre charge assessable against said land.

2. **Definition of "owners" and "users of water."**—The words "owners" and "users of water" as used in said act are construed to include any person, Indian or white, or any firm, partnership, corporation, association or other organization, to which title to the land to which water for irrigation purposes can be delivered, has passed, either by fee or trust patent or otherwise, and also any entryman or allottee of such land.

3. **Lands subject to partial payments for the year 1920.**—The lands under the Flathead project hereby made subject to partial payments for the year 1920 are those lands to which the United States delivered water during the irrigation season of 1920.

4. **Amount of payments required.**—Construction charges have not yet been determined or announced for said project. For the year

1920, each acre of the lands described in paragraph 3 shall be subject to a charge of 50 cents. These charges shall be paid by the owner of the land to the special fiscal agent, United States Reclamation Service, St. Ignatius, Mont.: *Provided*, That as to lands of Indian allottees for which patent in fee has not issued, the charges shall be paid to said fiscal agent, through the Bureau of Indian Affairs. The charges shall be due and payable on December 1, 1920, and to all charges not paid on March 1, next following the due date, there shall be added a penalty of 1 per cent thereof, and a like penalty of 1 per cent on the first day of each month thereafter, so long as such default shall continue, and no water shall be delivered to land for which such charges and penalties are unpaid one year or more after the due date. All principal sums so paid will be credited upon the construction charge per irrigable acre, hereafter to be announced by public notice.

5. **Lands subject to partial payments for the year 1921.**—The lands for which water can be delivered for irrigation purposes during the irrigation season of 1921, which shall be subject to the above mentioned charge, will be shown upon plats to be filed at a later date in the respective offices of the Indian Service and the United States Reclamation Service, at St. Ignatius, Mont., and in the local land offices located, respectively, at Missoula and Kalispell, Mont.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Flathead (Indian) project, June 30, 1921.

DEBITS.

Collections on hand and in special deposit		$3,414.01
Inventory of materials and supplies on hand		59,323.45
Plant and equipment in use		75,922.43
Current accounts receivable		39,092.23
Unearned value of contracts		12,097.51
Construction cost of works	$4,083,028.11	
Operation and maintenance during construction	410,902.37	
Unadjusted clearing accounts	[1] 2,200.65	
Gross construction cost	4,491,729.83	
Less revenues and adjustments during construction period	145,703.50	
Net construction cost		4,346,026.33
Investment items in transit		[1] 519.06
Total debits		4,535,356.90

CREDITS.

Current accounts payable		33,616.10
Contingent and deferred liabilities		15,258.31
Resources for repaying cost of project		14,148.93
Revenues held in reserve		3,476.50
Investment:		
Disbursements	$4,603,738.46	
Items in transit	[1] 519.06	
Total	4,603,219.40	
Less collections	134,362.34	
Net investment		4,468,857.06
Total credits		4,535,356.90

[1] Contra.

Statement of construction cost and revenue for fiscal year 1921 and total to June 30, 1921.

Principal features.	Fiscal year 1921.	To June 30, 1921.
Examination and surveys	$4,303.63	$68,188.63
Storage system:		
Mission division—		
Surveys	.....	15,652.24
Tabor Reservoir Tunnel and controlling works	.....	152,188.97
Post Division—		
Surveys	321.61	11,685.92
Ninepipe Reservoir Dam and controlling works	237.00	52,024.21
Ninepipe feeder canal	.....	3,757.71
Kickinghorse Reservoir feeder	.....	55,083.01
McDonald Lake Dam and controlling works	11,246.74	230,801.50
Crow Division—Surveys	.....	1,030.00
Pablo Division—		
Surveys	513.91	27,404.00
North Pablo Dam and controlling works	.....	73,235.47
Middle Pablo Dam	.....	4,619.96
South Pablo Dam and controlling works	.....	279,564.62
Horte Dam	.....	5,507.52
Polson Division—Surveys	.....	490.15
Camas Division—		
Surveys	.....	11,340.84
Little Bitterroot Dam and controlling works	250.00	29,115.57
Hubbart Reservoir	.....	17,011.68
Dry Fork Reservoir	83,699.16	85,226.24
Camp construction	9,800.20	9,800.20
Total storage system	106,068.62	1,065,539.81
Canal system:		
Mission Division—		
Surveys	3,559.51	4,821.32
Pablo feeder canal	59,280.90	176,721.39
Dry Creek lining	37,402.15	37,402.15
Pablo Division—		
Surveys	.....	26,954.59
Pablo feeder canal	.....	231,649.74
By-pass canal	608.61	15,049.56
Camas Division—		
Surveys	.....	3,011.12
Camas A Diversion Dam and headworks	.....	8,559.37
Camas A Tunnel	.....	49,929.13
Camas A Canal	1,927.24	208,688.03
Total, canal system	102,778.41	762,786.40
Lateral system:		
Jocko Division	1,941.25	167,079.95
Mission Division	16,776.17	209,579.47
Post Division	7,638.08	318,568.16
Moiese Division	1,104.78	327,442.31
Crow Division	.....	6,974.33
Pablo Division	15,866.59	451,541.80
Valley View Division	1,422.84	154,551.70
Polson Division	1,584.29	58,357.30
Camas Division	11,037.05	234,292.79
Camp Construction	3,705.03	3,705.03
Total lateral system	61,076.08	1,932,092.84
Drainage system: Polson Division—Polson Drain	44.98	53,137.76
Power system: Polson Division—Newell Tunnel	.....	101,685.11
Farm units: Project as a whole	12,160.06	46,907.57
Permanent improvements and lands:		
Headquarters Division	5,952.35	12,351.79
Jocko Division	1,204.42	1,645.00
Pablo Division—		
Horte camp buildings	370.17	4,517.13
Pablo camp buildings	.....	2,022.23
Moiese Division	[1] 1,408.83	450.00
Post Division	[1] 259.18	6,715.43
Mission Division	[1] 10,188.53	.....
Camas Division	1,116.51	7,971.52
Total permanent improvements and lands	[1] 3,213.09	35,673.10
Telephone system: Project as a whole	.....	17,016.89
Operation and maintenance during construction	88,060.11	410,902.37
Total cost of construction features	371,278.80	4,493,930.48
Less unadjusted clearing	[1] 2,200.65	[1] 2,200.65
Gross cost of construction features	369,078.15	4,491,729.83

[1] Contra.

Statement of construction cost and revenue for fiscal year 1921 and total to June 30, 1921—Continued.

Principal features.	Fiscal year 1921.	To June 30, 1921.
Less construction revenue earnings:		
Rental of buildings	$1,280.68	$10,445.77
Freight refunds	200.19	5,309.37
Revenues, miscellaneous	.....	8,270.73
Rental of irrigation water	36,843.54	123,549.84
Hospital operations	[1] 71.20	[1] 20.47
Farming operations	38.74	[1] 1,406.04
Field cost adjustment	3,048.96	[1] 403.19
Doubtful accounts	[1] 42.51	[1] 42.51
Total revenues	41,298.40	145,703.50
Net construction cost	327,779.75	4,346,026.33

[1] Contra.

Costs by calendar years, Flathead (Indian) project.

	Construction.		
	Original.	Operation and maintenance during construction.	Total.
Year ending Dec. 31—			
1908	$25,303.90	.....	$25,303.90
1909	149,160.88	.....	149,160.88
1910	242,779.63	.....	242,779.63
1911	416,550.60	$4,719.97	421,270.57
1912	211,971.63	8,614.63	220,586.26
1913	166,360.35	18,789.00	185,149.35
1914	186,724.49	24,423.08	211,147.57
1915	156,159.17	29,061.80	185,220.97
1916	379,881.65	28,774.13	408,655.78
1917	870,509.53	51,083.80	921,593.33
1918	494,912.70	65,969.59	560,882.29
1919	359,900.54	62,157.36	422,057.90
1920	320,978.43	70,688.09	391,666.52
Jan. to June 30, 1921	99,633.96	46,620.92	146,254.88
Total	4,080,827.46	410,902.37	4,491,729.83

Costs by fiscal years, Flathead (Indian) project.

	Construction.		
	Original.	Operation and maintenance during construction.	Total.
Year ending June 30—			
1908	$3,347.89	.....	$3,347.89
1909	66,571.91	.....	66,571.91
1910	185,377.41	.....	185,377.41
1911	341,840.64	.....	341,840.64
1912	341,334.95	$8,148.67	349,483.62
1913	162,105.21	14,075.25	176,180.46
1914	243,227.82	19,849.42	263,077.24
1915	104,257.28	28,860.76	133,118.04
1916	228,229.35	27,354.10	255,583.45
1917	656,044.72	29,562.42	685,607.14
1918	713,949.15	72,679.31	786,628.46
1919	367,841.42	63,041.39	430,882.81
1920	385,681.67	59,270.94	444,952.61
1921	281,018.04	88,060.11	369,078.15
Total	4,080,827.46	410,902.37	4,491,729.83

General expense, Flathead (Indian) project.

	Fiscal year 1921.			To June 30, 1921.		
	Construction.	Operation and maintenance during construction.	Total.	Construction.	Operation and maintenance during construction.	Total.
Washington office	$9,635.88	$2,260.26	$11,896.14	$103,361	$14,362	$117,723
Project office	22,751.64	5,336.80	28,088.44	276,918	38,478	315,396
Denver office	5,216.45	1,223.60	6,440.05	33,543	4,660	38,203
District counsel's office	1,256.47	294.72	1,551.19	9,596	1,333	10,929
Other offices and miscellaneous	.....	.....	.....	1,571	218	1,789
Total	38,860.44	9,115.38	47,975.82	424,989	59,051	484,040
Percentage of general expense to gross cost	13.8	10.3	12.9	10.4	14.4	10.8

MONTANA, FORT PECK (INDIAN) PROJECT.

S. A. Kerr, project manager, Poplar, Mont.

LOCATION.

Counties: Roosevelt, Sheridan, Valley, and Daniels.
Townships: 26 to 33 N., Rs. 39 to 56 E., Montana meridian.
Railroad: Great Northern.
Project cities and towns and estimated population June 30, 1921: Frazer, 250; Oswego, 300; Wolf Point, 2,098; Poplar, 1,152; Brockton, 200.

WATER SUPPLY.

Source of water supply: Missouri and Poplar Rivers, Little Porcupine, Big Porcupine, Wolf, Smoke, and Big Muddy Creeks.
Area of drainage basins: Missouri River, 85,000 square miles; Poplar River, 3,000 square miles; Little Porcupine Creek, 350 square miles; Big Porcupine Creek, 683 square miles; Wolf Creek, 215 square miles; Smoke Creek, 285 square miles; Big Muddy Creek, 4,550 square miles.
Mean annual run-off in acre-feet, 1909 to 1920: Poplar River, 97,700; Big Porcupine, 20,700; Big Muddy Creek, 40,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which Service is prepared to supply water, season of 1921: Little Porcupine Division, 2,330 acres; Poplar River Division, 10,290 acres; Big Porcupine Division, 4,000 acres; Big Muddy Division, 2,000 acres.
Area irrigated, season of 1921: 1,017 acres to June 30, 1921.
Length of irrigating season: April 1 to August 31, 153 days.
Average elevation of irrigable area: 2,000 feet above sea level.
Rainfall on irrigable area: 1886 to 1920, average 13.30 inches; 1920, 9.33 inches.
Mean of maximum temperatures, 1884 to 1920, 102.3° F.; mean of minimum, −40.5° F.
Character of soil of irrigable area: Heavy clay and loam.
Principal crops: Hay, grain, and vegetables.
Principal markets: Local and Minneapolis and St. Paul.

LAND OPENED FOR IRRIGATION.

In the construction of the system, laterals are being constructed to the allotted area only. The allotted irrigable area in each division is as follows: Big Porcupine, 6,400 acres; Little Porcupine, 2,330 acres; Missouri River, 38,000 acres; Poplar River, 11,600 acres; Big Muddy, 12,900 acres.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1908.
Little Porcupine Division completed to 2,330 acres in 1911.
Poplar River Division completed to 7,890 acres in 1916.
Big Porcupine Division completed to 4,000 acres in 1917.
Muddy Division completed to 2,000 acres in 1921.
Entire project 24.8 per cent completed June 30, 1921.

IRRIGATION PLAN.

The irrigation plan for the Fort Peck project provides, in so far as the water supply is found sufficient, for the irrigation of lands within the Port Peck Indian Reservation and adjacent territory as follows: (1) 4,000 acres in the vicinity of Wiota, from the natural flow of Big Porcupine Creek supplemented by storage on the Middle Fork of the creek; (2) 2,000 acres in the vicinity of Frazer, with water from Little Porcupine Creek conserved by storage; (3) 24,000 acres in Poplar River valley, with water from Poplar River conserved by storage just below the junction of Poplar River and West Branch; (4) 20,000 acres west of Big Muddy Creek from natural flow of

Big Muddy, Wolf, and Smoke Creeks, and storage in Medicine Lake, Wolf Creek, and Smoke Creek Reservoirs; (5) 50,000 acres of bottom land and 34,000 acres of brush and timber land north of the Missouri River, with water from the Missouri River by a gravity canal heading near the site of old Fort Peck; (6) 10,000 acres known as the Galpin Bottom Division, adjacent to the Missouri River Canal west of Milk River, with water from the Missouri River Canal by pumping with a lift of about 20 feet; (7) 8,000 acres adjacent to the Missouri River Canal east of Milk River, with water from the Missouri River Canal by pumping with a lift of 10 to 20 feet. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The Little Porcupine Division, with a storage reservoir of 3,900 acre-feet capacity, has been completed to irrigate 2,330 acres. In Poplar River Division, Poplar River West Canal B has been completed to irrigate 2,560 acres, Poplar River East Canal C to irrigate 5,330 acres, and D Canal to cover 2,400 acres. For Big Porcupine Division, canals to irrigate 4,000 acres have been completed, and a reservoir of 3,800 acre-feet capacity has been constructed on the Middle Fork of Big Porcupine Creek. Big Muddy Division has been completed to irrigate 2,000 acres. All the areas given above are allotted lands, and for practically all divisions considerable additional areas could be brought under the canals at small expense by the placing of additional turnouts and the construction of a few small laterals.

During the fiscal year 1922 Big Muddy Division will be completed to an additional area of 2,000 acres. Future work will include the construction of storage for Poplar River and Big Muddy Divisions and the completion of their canal systems, and the construction of the Missouri River Canal to irrigate 37,900 acres of allotted land which lies along the Great Northern Railway and on which most of the Indians have their homes.

SUMMARY OF GENERAL DATA FOR FORT PECK (INDIAN) PROJECT TO END OF FISCAL YEAR 1921.

Areas:		
Irrigable acreage when project is complete		152,000
Public land entered to June 30, 1921	9,713	
Public land open to entry on June 30, 1921	107	
State land unsold, June 30, 1921	80	
Indian land, June 30, 1921	140,700	
Private land, June 30, 1921	1,400	
Acreage Service could have supplied water in season 1920		16,620
Estimated acreage Service can supply in season 1921		18,620
Estimated acreage Service can supply in season 1922		20,620
Acreage irrigated, season 1920		1,568
Acreage cropped under irrigation, season 1920		1,545
Acreage dry farmed, season 1920		3,346
Crops:		
Value of irrigated crops, season 1920		$30,269.00
Value of irrigated crops per acre cropped		19.60
Finances:		
Appropriation—		
Fiscal year 1921—		
Amount specified in appropriation act	$40,000.00	
Unencumbered balance previous years	37,085.31	
Miscellaneous collections	2,294.59	
Increase of compensation	3,983.48	
Total amount authorized		83,363.38
Encumbrances—		
Disbursements	40,920.73	
Current liabilities	5,562.80	
Contingent liabilities		
Increase of compensation	3,983.48	
Total encumbrances		50,467.01
Unencumbered balance July 1, 1921		32,896.37
Fiscal year 1922—		
Amount specified in appropriation act		20,000.00
Inventories:		
Value of stock on hand		15,996.43
Value of plant and equipment in use		26,385.15
Construction cost and per cent completed:		
Gross cost to June 30, 1921	$830,454.77	
Less revenues and adjustments	3,800.80	
Net cost to June 30, 1921		826,653.97
Per cent completed on June 30, 1921	24.8	
Estimated per cent completed on June 30, 1922	26.4	
Estimated per cent completed on June 30, 1923	45.5	
Value of construction water-right contracts and other resources to repay net cost of project		703.50
Revenues held in reserve		325.00

Status of returns on account of construction and various classes of revenues as of June 30, 1921.

Accounts.	Due.	Collected.			Uncollected.
		Cash.	Other credits.	Total.	
Construction charges	$703.50	$326.72	.....	$326.72	$376.78
Rentals, irrigation water	3,014.62	2,400.65	$69.15	2,469.80	544.82
Total	3,718.12	2,727.37	69.15	2,796.52	921.60

CONSTRUCTION DURING FISCAL YEAR.

During the fiscal year 1921 work continued on minor structures on the Big Muddy Division. Two concrete siphons to replace flumes were under construction on Poplar River Division.

OPERATION AND MAINTENANCE.

Water was available for Little Porcupine and Big Porcupine Divisions throughout the season of 1920, but the supply for Poplar River Division was entirely inadequate owing to the small flow in the stream and to the lack of storage facilities. This flow after about June 30 was barely sufficient to irrigate gardens and a little alfalfa.

For the first five months of 1921 the precipitation was below normal and there was considerable demand for water, but the last half of June was unusually wet, so that there was no demand after the 17th. Heavy rains from the 17th to 20th did considerable damage to the canals, particularly on Poplar River Division, but were of great advantage to Little Porcupine and Big Porcupine Divisions, as the inflow to the reservoirs on both these divisions was heavy, and there should be ample storage for the remainder of the season.

Historical review, Fort Peck project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Acreage for which Service was prepared to supply water	12,620	12,620	14,220	16,620	16,620	16,620
Acreage irrigated	1,100	1,092	1,602	1,299	1,047	1,568
Miles of canals operated	85	85	126	158	158	158
Water diverted (acre-feet)	3,000	3,500	3,600	3,000	3,000	3,600
Water delivered to land (acre-feet)	1,560	2,250	1,550	1,400	2,000	2,000
Per acre of land irrigated (acre-feet)	1.42	1.5	1.2	1.08	1.9	1.3

SETTLEMENT.

With the exception of Galpin Bottom Division, which was mostly homesteaded prior to the inception of the project, none of the land under the project has been open to settlement. Under the provisions of the act of May 30, 1908 (35 Stat., 558), there were allotted to each Indian 40 acres of irrigable land and to each family 20 acres of timber land. All these irrigable allotments and practically all timber allotments are within the project area and cover about 85,000 acres of the 142,000 classed as irrigable within the reservation. Under a recent act of Congress provision is made for allotment of irrigable land to about 600 Indian children born since the original allotment.

These new allotments will total about 24,000 acres and will leave little desirable land should the project later be opened to settlement. With all land under the project allotted to Indians or reserved for future allotment, settlement by whites has necessarily been slow, as lands available are limited to allotments of deceased Indians sold by the Indian Service and patented allotments for sale by Indian owners.

Settlement data, Fort Peck project, by calendar years.

Item.	1915	1916	1917	1918	1919	1920
Total number of allotments on project (irrigable)	1,780	1,780	1,780	1,780	1,780	1,780
Population (Indian)	2,046	2,092	2,130	2,160	2,157	2,070
Number of irrigated farms	42	48	58	66	62	70
Operated by owners or managers	40	46	57	60	37	45
Operated by tenants	2	2	1	6	25	25
Population	110	130	134	130	110	150
Number of towns	5	5	5	5	5	5
Population (white)	1,780	2,200	2,650	3,500	4,850	5,000
Total population in towns and on farms	1,890	2,330	2,784	3,630	4,960	5,150
Number of schools:						
Indian	5	5	5	5	4	4
White	3	5	5	5	5	5
Number of churches	7	7	8	9	9	10
Number of banks	5	4	6	9	9	9
Total capital stock	$105,000	$110,000	$130,000	$185,000	$225,000	$225,000
Amount of deposits	$234,000	$477,000	$580,000	$1,095,000	$1,555,000	$1,700,000
Number of depositors	1,400	1,970	2,630	3,700	4,500	4,700

PRINCIPAL CROPS.

The principal crops are wheat, flax, oats, and blue-joint hay. More interest is being shown yearly in alfalfa, and the acreage, though small, is steadily increasing.

Crop report, Fort Peck (Indian) project, Montana, 1920.

Crop.	Area (acres).	Yields.			Values.		
		Unit of yield.	Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	110	Ton	225	2.1	$15.00	3,375	$30.68
Garden	30	Pound				3,027	100.00
Grass, Sedan	149	Ton	291	1.9	15.00	4,365	29.30
Hay	816	do	674	.8	15.00	10,110	12.39
Millet	15	do	30	2.0	15.00	450	30.00
Oats	105	Bushel	2,800	26.3	.80	2,240	21.30
Pastures	150					1,875	12.50
Potatoes	10	Bushel	1,810	187	1.50	2,715	295.11
Wheat	160	do	1,320	8.2	1.60	2,112	13.20
Total cropped	1,545	Total and average				30,269	19.60
Irrigated, not cropped	23						
Total irrigated	1,568						

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	4,120	103	24.8
Total irrigated area farms reported under rental contract	1,568	103	9.4
Total cropped area farms reported	1,545	103	9.3

PUBLIC NOTICE AND ORDER.

RULES AND REGULATIONS REQUIRING PARTIAL PAYMENTS ON CONSTRUCTION COST, NOVEMBER 29, 1920.

1. **Act of February 14, 1920.**—The Indian appropriation act of February 14, 1920 (41 Stat., 409), directs the Secretary of the Interior to require all owners of irrigable lands under any irrigation system heretofore or hereafter constructed for the benefit of the Indians, to which land water for irrigation purposes can be delivered, to begin partial reimbursement of the construction cost, at such time and in such amounts as the Secretary may deem best; all payments to be credited on a per-acre basis in favor of the land in behalf of which such payments shall have been made, and to be deducted from the total per-acre charge assessable against said land.

2. **Definition of "owners" and "users of water."**—The words "owners" and "users of water" as used in said act are construed to include any person, Indian or white, or any firm, partnership, corporation, association, or other organization, to which title to the land to which water for irrigation purposes can be delivered, has passed, either by fee or trust patent or otherwise, and also any entryman or allottee of such land.

3. **Lands subject to partial payments for the year 1920.**—The lands under the Fort Peck project hereby made subject to partial payments for the year 1920 are those lands to which the United States delivered water during the irrigation season of 1920.

4. **Amount of payments required.**—Construction charges have not yet been determined or announced for said project. For the year 1920, each irrigable acre of the lands described in paragraph 3 shall be subject to a charge of 50 cents. These charges shall be paid by the owner of the land to the special fiscal agent, United States Reclamation Service, Poplar, Mont.: *Provided*, That as to lands of Indian allottees for which patent in fee has not issued, the charges shall be paid to said fiscal agent, through the Bureau of Indian Affairs. The charges shall be due and payable on December 1, 1920, and to all charges not paid on March 1, next following the due date, there shall be added a penalty of 1 per cent thereof, and a like penalty of 1 per cent on the first day of each month thereafter, so long as such default shall continue, and no water shall be delivered to land for which such charges and penalties are unpaid one year or more after the due date. All principal sums so paid will be credited upon the construction charge per irrigable acre, hereafter to be announced by public notice.

5. **Land subject to partial payments for the year 1921.**—The lands for which water can be delivered for irrigation purposes during the irrigation season of 1921, which shall be subject to the above-mentioned charge, will be shown upon plats to be filed at a later date in the respective offices of the Indian Service and the United States Reclamation Service at Poplar, Mont., and in the local land office located at Glasgow, Mont.

JOHN BARTON PAYNE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Condensed financial statement, Fort Peck (Indian) project, June 30, 1921.

DEBITS.

Inventory of materials and supplies on hand		$15,996.43
Plant and equipment in use		26,385.15
Current accounts receivable		921.60
Unearned value of contracts		60.00
Construction cost of works	$771,934.28	
Operation and maintenance during construction	58,520.49	
Gross construction cost	830,454.77	
Less revenues and adjustments during construction period	3,800.80	
Net construction cost		826,653.97
Investment items in transit		[1] 249.66
Total debits		869,767.49

CREDITS.

Current accounts payable		6,703.63
Contingent and deferred liabilities		
Resources for repaying cost of project		709.22
Revenues held in reserve		325.00
Investments:		
Disbursements	$872,274.64	
Items in transit	[1] 249.66	
Total	872,024.98	
Less collections	9,995.34	
Net investment		862,029.64
Total credits		869,767.49

Construction cost and revenue, Fort Peck (Indian) project.

Features.	Fiscal year 1921.	Total to June 30, 1921.
Examinations and surveys:		
Missouri River Canal		$31,421.00
Project as a whole (stream gaging)	$797.23	4,236.81
Big Muddy Division		118.10
Poplar River Division		3,261.37
	797.23	39,037.28
Storage system:		
Big Porcupine Division	430.62	112,093.34
Little Porcupine Division	412 17	46,742.39
Poplar River Division	53.46	4,491.39
Medicine Lake Reservoir	1,510.44	3,384.96
	2,406.69	166,712.08
Canal system:		
Poplar River Division	8,652.56	220,945.56
Big Porcupine Division		64,487.87
Big Muddy Division	4,050.93	68,485.31
	12,703.49	353,918.74
Lateral system:		
Little Porcupine Division		24,576.17
Poplar River Division		55,620.48
Big Porcupine Division		72,722.99
Big Muddy Division	22,171.99	52,815.62
	22,171.99	205,735.26
Farm units plats:		
Poplar River Division	3,253.98	3,253.98
Big Porcupine Division	383.41	383.41
Little Porcupine Division	196.70	196.70
	3,834.09	3,834.09
Drainage system: Big Muddy Division	[1] 8,984.42	

[1] Contra.

Construction cost and revenue, Fort Peck (Indian) project—Continued.

Feature.	Fiscal year 1921.	Total to June 30, 1921.
Telephone system:		
Poplar River Division	.....	$1,626.71
Big Porcupine Division	.....	1,048.47
Big Muddy Division	.....	21.65
	.....	2,696.83
Operation and maintenance during construction	$16,630.29	58,520.49
Unadjusted clearing account	[1] 1,430.06	.....
Gross construction cost to June 30, 1921	48,129.30	830,454.77
Less revenues earned during construction period:		
Rentals of irrigation water	1,022.02	3,014.62
Doubtful accounts	92.11	92.11
Farming operations	196.41	[1] 215.62
Hospital	155.47	909.69
Total	1,466.01	3,800.80
Net construction cost to June 30, 1921	46,663.29	826,653.97

[1] Contra.

Cost, by calendar years, Fort Peck (Indian) project.

	Construction.		Total cost.
	Original.	Operation and maintenance during.	
Year ending Dec. 31—			
1908	$7,019.16	.....	$7,019.16
1909	32,821.37	.....	32,821.37
1910	85,382.50	.....	85,382.50
1911	70,127.23	.....	70,127.23
1912	17,110.85	$823.07	17,933.92
1913	117,299.74	2,410.22	119,709.96
1914	104,293.99	5,863.03	110,157.02
1915	26,645.61	2,113.23	28,758.84
1916	31,623.33	5,501.69	37,125.02
1917	86,344.04	11,533.34	97,877.38
1918	61,783.97	4,973.67	66,757.64
1919	73,095.88	5,120.00	78,215.88
1920	45,586.40	10,770.78	56,357.18
Jan. 1 to June 30, 1921	12,800.21	9,411.46	22,211.67
Total	771,934.28	58,520.49	830,454.77

Cost, by fiscal years, Fort Peck, (Indian) project.

	Construction.		Total cost.
	Original.	Operation and maintenance during.	
Year ending June 30—			
1909	$12,548.37	.....	$12,548.37
1910	50,705.86	.....	50,705.86
1911	117,180.84	.....	117,180.84
1912	16,466.80	$188.89	16,655.69
1913	73,892.56	1,775.86	75,668.42
1914	109,713.74	3,984.28	113,698.02
1915	58,999.93	3,723.77	62,723.70
1916	31,200.90	4,911.75	36,112.65
1917	52,525.22	8,682.68	61,207.90
1918	85,343.61	6,868.92	92,212.53
1919	43,387.19	5,909.11	49,296.30
1920	88,470.25	5,844.94	94,315.19
1921	31,499.01	16,630.29	48,129.30
Total	771,934.28	58,520.49	830,454.77

General expense, Fort Peck (Indian) project.

Office.	Fiscal year 1921.	Total to June 30, 1921.
Washington office	$1,986.83	$51,269.84
Project office	4,873.41	59,555.77
Denver office	796.41	5,674.85
District counsel's office	362.24	1,846.61
Other offices		779.66
Total	[1] 8,018.89	[1] 119,126.73
Percentage of general expense to gross construction cost	16.2	14.3

[1] Includes operation and maintenance during construction.

APPENDIX.

LEGISLATION.

THE NATIONAL IRRIGATION ACT.

An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands. (Act of June 17, 1902, ch. 1093, 32 Stat., 388.)

Sec. 1. [Reclamation fund established from public-land receipts—Exception—Support of agricultural colleges—Deficiency.] That all moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, beginning with the fiscal year ending June 30, 1901, including the surplus of fees and commissions in excess of allowances to registers and receivers, and excepting the 5 per centum of the proceeds of the sales of public lands in the above States set aside by law for educational and other purposes, shall be, and the same are hereby, reserved, set aside, and appropriated as a special fund in the Treasury to be known as the reclamation fund, to be used in the examination and survey for the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semi-arid lands in the said States and Territories, and for the payment of all other expenditures provided for in this act: *Provided*, That in case the receipts from the sale and disposal of public lands other than those realized from the sale and disposal of lands referred to in this section are insufficient to meet the requirements for the support of agricultural colleges in the several States and Territories, under the act of August 30, 1890, entitled "An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts, established under the provisions of an act of Congress approved July 2, 1862," the deficiency, if any, in the sum necessary for the support of the said colleges shall be provided for from any moneys in the Treasury not otherwise appropriated. [*32 Stat., 388.*]

Sec. 2. [Authority to locate and construct irrigation works—Report to Congress.] That the Secretary of the Interior is hereby authorized and directed to make examinations and surveys for, and to locate and construct, as herein provided, irrigation works for the storage, diversion, and development of waters, including artesian wells, and to report to Congress at the beginning of each regular session as to the results of such examinations and surveys, giving estimates of cost of all contemplated works, the quantity and location of the lands which can be irrigated therefrom, and all facts relative to the practicability of each irrigation project; also the cost of works in process of construction, as well as of those which have been completed. [*32 Stat., 388.*]

Sec. 3. [Withdrawal of lands for irrigation works—Withdrawal of lands susceptible of irrigation—Homestead entries—Determination whether project is practicable—Restoration and entry—Commutation.] That the Secretary of the Interior shall, before giving the public notice provided for in section 4 of this act, withdraw from public entry the lands required for any irrigation works contemplated under the provisions of this act, and shall restore to public entry any of the lands so withdrawn when, in his judgment, such lands are not required for the purposes of this act; and the Secretary of the Interior is hereby authorized, at or immediately prior to the time of beginning the surveys for any contemplated irrigation works, to withdraw from entry, except under the homestead laws, any public lands believed to be susceptible of irrigation from said works: *Provided*, That all lands entered and entries made under the homestead laws within areas so withdrawn during such withdrawal shall be subject to all the provisions, limitations, charges, terms, and conditions of this act; that said surveys shall be prosecuted diligently to completion, and upon the completion thereof and of the necessary maps, plans, and estimates of cost the Secretary of the Interior shall determine whether or not said project is practicable and advisable, and if determined to be impracticable or inadvisable he shall thereupon restore said lands to entry; that public lands which it is proposed to irrigate by means of any contem-

plated works shall be subject to entry only under the provisions of the homestead laws in tracts of not less than forty nor more than one hundred and sixty acres, and shall be subject to the limitations, charges, terms, and conditions herein provided: *Provided*, That the commutation provisions of the homestead laws shall not apply to entries made under this act. [*32 Stat., 388.*]

Sec. 4. [Contracts for construction—Public notice of irrigable lands, limit of area, charges per acre, and method of payment—Limit of work hours—Mongolian labor.] That upon the determination by the Secretary of the Interior that any irrigation project is practicable, he may cause to be let contracts for the construction of the same, in such portions or sections as it may be practicable to construct and complete as parts of the whole project, providing the necessary funds for such portions or sections are available in the reclamation fund, and thereupon he shall give public notice of the lands irrigable under such project and limit of area per entry, which limit shall represent the acreage which, in the opinion of the Secretary, may be reasonably required for the support of a family upon the lands in question; also of the charges which shall be made per acre upon the said entries, and upon lands in private ownership which may be irrigated by the waters of the said irrigation project, and the number of annual installments, not exceeding ten, in which such charges shall be paid and the time when such payments shall commence. The said charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction of the project, and shall be apportioned equitably: *Provided*, That in all construction work eight hours shall constitute a day's work, and no Mongolian labor shall be employed thereon. [*32 Stat., 389.*]

Sec. 5. [Requirements of entrymen—Limit of 160 acres—Residence—Payments—Disposal of receipts—Commissions.] That the entryman upon lands to be irrigated by such works shall, in addition to compliance with the homestead laws, reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and before receiving patent for the lands covered by his entry shall pay to the Government the charges apportioned against such tract, as provided in section four. No right to the use of water for land in private ownership shall be sold for a tract exceeding one hundred and sixty acres to any one landowner, and no such sale shall be made to any landowner unless he be an actual bona fide resident on such land, or occupant thereof residing in the neighborhood of said land, and no such right shall permanently attach until all payments therefor are made. The annual installments shall be paid to the receiver of the local land office of the district in which the land is situated, and a failure to make any two payments when due shall render the entry subject to cancellation, with the forfeiture of all rights under this act, as well as of any moneys already paid thereon. All moneys received from the above sources shall be paid into the reclamation fund. Registers and receivers shall be allowed the usual commissions on all moneys paid for lands entered under this act. [*32 Stat., 389.*]

Sec. 6. [Reclamation fund to be used for operation and maintenance—Management of works to pass to landowners—Title.] That the Secretary of the Interior is hereby authorized and directed to use the reclamation fund for the operation and maintenance of all reservoirs and irrigation works constructed under the provisions of this act: *Provided*, That when the payments required by this act are made for the major portion of the lands irrigated from the waters of any of the works herein provided for, then the management and operation of such irrigation works shall pass to the owners of the lands irrigated thereby, to be maintained at their expense under such form of organization and under such rules and regulations as may be acceptable to the Secretary of the Interior: *Provided*, That the title to and the management and operation of the reservoirs and the works necessary for their protection and operation shall remain in the Government until otherwise provided by Congress. [*32* Stat., *389.*]

Sec. 7. [Authority to acquire property—Attorney General to institute condemnation proceedings.] That where in carrying out the provisions of this act it becomes necessary to acquire any rights or property, the Secretary of the Interior is hereby authorized to acquire the same for the United States by purchase or by condemnation under judicial process, and to pay from the reclamation fund the sums which may be needed for that purpose, and it shall be the duty of the Attorney General of the United States upon every application of the Secretary of the Interior, under this act, to cause proceedings to be commenced for condemnation within thirty days from the receipt of the application at the Department of Justice. [*32 Stat., 389.*]

Sec. 8. [Irrigation laws of States and Territories not affected—Interstate streams—Water rights.] That nothing in this act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with such laws, and nothing herein

shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof: *Provided*, That the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated and beneficial use shall be the basis, the measure, and the limit of the right. [*32 Stat., 390.*]

Sec. 9. [Repealed by section 6, act of June 25, 1910, 36 Stat., 835.]

Sec. 10. [Authority to make rules and regulations.] That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect. [*32 Stat., 390.*]

THE EXTENSION ACT.

An act extending the period of payment under reclamation projects, and for other purposes. (Act Aug. 13, 1914, ch. 247, 38 Stat., 686.)

Sec. 1. [Payments of construction charges under future rights—Entry before charge is established.] That any person whose lands hereafter become subject to the terms and conditions of the act approved June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," and acts amendatory thereof or supplementary thereto, hereafter to be referred to as the reclamation law, and any person who hereafter makes entry thereunder shall at the time of making water-right application or entry, as the case may be, pay into the reclamation fund 5 per centum of the construction charge fixed for his land as an initial installment, and shall pay the balance of said charge in fifteen annual installments, the first five of which shall each be 5 per centum of the construction charge and the remainder shall each be 7 per centum until the whole amount shall have been paid. The first of the annual installments shall become due and payable on December 1 of the fifth calendar year after the initial installment: *Provided*, That any water-right applicant or entryman may, if he so elects, pay the whole or any part of the construction charges owing by him within any shorter period: *Provided further*, That entry may be made whenever water is available, as announced by the Secretary of the Interior, and the initial payment be made when the charge per acre is established. [*38 Stat., 686.*]

Sec. 2. [Payments of construction charges under existing rights.] That any person whose land or entry has heretofore become subject to the terms and conditions of the reclamation law shall pay the construction charge, or the portion of the construction charge remaining unpaid, in twenty annual installments, the first of which shall become due and payable on December 1 of the year in which the public notice affecting his land is issued under this act, and subsequent installments on December 1 of each year thereafter. The first four of such installments shall each be 2 per centum, the next two installments shall each be 4 per centum, and the next fourteen each 6 per centum of the total construction charge, or the portion of the construction charge unpaid at the beginning of such installments. [*38 Stats., 687.*]

Sec. 3. [Penalties for nonpayment of construction charges—Cancellation and forfeiture—Actions for recovery.] That if any water-right applicant or entryman shall fail to pay any installment of his construction charges when due, there shall be added to the amount unpaid a penalty of 1 per centum thereof, and there shall be added a like penalty of 1 per centum of the amount unpaid on the first day of each month thereafter so long as such default shall continue. If any such applicant or entryman shall be one year in default in the payment of any installment of the construction charges and penalties, or any part thereof, his water-right application, and if he be a homestead entryman his entry also, shall be subject to cancellation, and all payments made by him forfeited to the reclamation fund, but no homestead entry shall be subject to contest because of such default: *Provided*, That if the Secretary of the Interior shall so elect, he may cause suit or action to be brought for the recovery of the amount in default and penalties; but if suit or action be brought, the right to declare a cancellation and forfeiture shall be suspended pending such suit or action. [*38 Stat., 687.*]

Sec. 4. [Restriction on increasing construction charges—Time for paying increase—Charges subject to certain conditions.] That no increase in the construction charges shall hereafter be made, after the same have been fixed by public notice, except by agreement between the Secretary of the Interior and a majority of the water-right applicants and entrymen to be affected by such increase, whereupon all water-right applicants and entrymen in the area proposed to be affected by the increased charge shall become subject thereto. Such increased charge shall be added to the construction charge and payment thereof distributed over the remaining unpaid installments

of construction charges: *Provided*, That the Secretary of the Interior, in his discretion, may agree that such increased construction charge shall be paid in additional annual installments, each of which shall be at least equal to the amount of the largest installment as fixed for the project by the public notice theretofore issued. And such additional installments of the increased construction charge, as so agreed upon, shall become due and payable on December 1 of each year subsequent to the year when the final installment of the construction charge under such public notice is due and payable: *Provided further*, That all such increased construction charges shall be subject to the same conditions, penalties, and suit or action as provided in section three of this act. [*38 Stat., 687.*]

Sec. 5. [Operation and maintenance charges—Basis therefor—Minimum charge—Secretary may transfer care and operation of project—Reduction or increase of charges.] That in addition to the construction charge, every water-right applicant, entryman, or landowner under or upon a reclamation project shall also pay, whenever water service is available for the irrigation of his land, an operation and maintenance charge based upon the total cost of operation and maintenance of the project, or each separate unit thereof, and such charge shall be made for each acre-foot of water delivered; but each acre of irrigable land, whether irrigated or not, shall be charged with a minimum operation and maintenance charge based upon the charge for delivery of not less than one acre-foot of water: *Provided*, That whenever any legally organized water users' association or irrigation district shall so request, the Secretary of the Interior is hereby authorized, in his discretion, to transfer to such water users' association or irrigation district the care, operation, and maintenance of all or any part of the project works, subject to such rules and regulations as he may prescribe. If the total amount of operation and maintenance charges and penalties collected for any one irrigation season on any project shall exceed the cost of operation and maintenance of the project during that irrigation season, the balance shall be applied to a reduction of the charge on the project for the next irrigation season, and any deficit incurred may likewise be added to the charge for the next irrigation season. [*38 Stat., 687.*]

Sec. 6. [Date when charges become due fixed by the Secretary—Discount for prompt payment—Penalty for nonpayment—Cancellation for continued arrears—Actions for recovery.] That all operation and maintenance charges shall become due and payable on the date fixed for each project by the Secretary of the Interior, and if such charge is paid on or before the date when due there shall be a discount of 5 per centum of such charge; but if such charge is unpaid on the first day of the third calendar month thereafter, a penalty of 1 per centum of the amount unpaid shall be added thereto, and thereafter an additional penalty of 1 per centum of the amount unpaid shall be added on the first day of each calendar month if such charge and penalties shall remain unpaid, and no water shall be delivered to the lands of any water-right applicant or entryman who shall be in arrears for more than one calendar year for the payment of any charge for operation and maintenance or any annual construction charge and penalties. If any water-right applicant or entryman shall be one year in arrears in the payment of any charge for operation and maintenance and penalties, or any part thereof, his water-right application, and if he be a homestead entryman his entry also, shall be subject to cancellation, and all payments made by him forfeited to the reclamation fund, but no homestead entry shall be subject to contest because of such arrears. In the discretion of the Secretary of the Interior suit or action may be brought for the amounts in default and penalties in like manner as provided in section three of this act. [*38 Stat., 688.*]

Sec. 7. [Local association may be appointed fiscal agent for the United States to collect charges—Official receipt.] That the Secretary of the Interior is hereby authorized, in his discretion, to designate and appoint, under such rules and regulations as he may prescribe, the legally organized water users' association or irrigation district, under any reclamation project, as the fiscal agent of the United States to collect the annual payments on the construction charge of the project and the annual charges for operation and maintenance and all penalties: *Provided*, That no water-right applicant or entryman shall be entitled to credit for any payment thus made until the same shall have been paid over to an officer designated by the Secretary of the Interior to receive the same. [*38 Stat., 688.*]

Sec. 8. [Authority to make regulations governing use of water, reclamation, and cultivation—Penalty for noncompliance with regulations.] That the Secretary of the Interior is hereby authorized to make general rules and regulations governing the use of water in the irrigation of the lands within any project, and may require the reclamation for agricultural purposes and the cultivation of one-fourth the irrigable area under each water-right application or entry within three full irrigation seasons after the filing of water-right application or entry, and the reclamation for agricultural purposes and the cultivation of one-half the irrigable area within five full irrigation seasons after the filing of the water-right application or entry, and shall provide for

continued compliance with such requirements. Failure on the part of any water-right applicant or entrymen to comply with such requirements shall render his application or entry subject to cancellation. [*38 Stat., 688.*]

Sec. 9. [Additional construction charges for certain lands.] That in all cases where application for water right for lands in private ownership or lands held under entries not subject to the reclamation law shall not be made within one year after the passage of this act, or within one year after notice issued in pursuance of section 4 of the reclamation act, in cases where such notice has not heretofore been issued, the construction charges for such land shall be increased 5 per centum each year until such application is made and an initial installment is paid. [*38 Stat., 689.*]

Sec. 10. [Entries prior to June 25, 1910—Disposal of relinquished lands.] That the act of Congress approved February 18, 1911, entitled "An act to amend section 5 of the act of Congress of June 25, 1910, entitled 'An act to authorize advances to the reclamation fund and for the issuance and disposal of certificates of indebtedness in reimbursement therefor, and for other purposes,'" be, and the same hereby is, amended so as to read as follows:

"Sec. 5. That no entry shall be hereafter made and no entryman shall be permitted to go upon lands reserved for irrigation purposes until the Secretary of the Interior shall have established the unit of acreage per entry, and water is ready to be delivered for the land in such unit or some part thereof and such fact has been announced by the Secretary of the Interior: *Provided*, That where entries made prior to June 25, 1910, have been or may be relinquished, in whole or in part, the lands so relinquished shall be subject to settlement and entry under the reclamation law." [*38 Stat., 689.*]

Sec. 11. [Furnishing water before regular rates are fixed.] That whenever water is available and it is impracticable to apportion operation and maintenance charges as provided in section 5 of this act, the Secretary of the Interior may, prior to giving public notice of the construction charge per acre upon land under any project, furnish water to any entryman or private landowner thereunder until such notice is given, making a reasonable charge therefor, and such charges shall be subject to the same penalties and to the provisions for cancellation and collection as herein provided for other operation and maintenance charges. [*38 Stat., 689.*]

Sec. 12. [Owners of private lands under new projects must dispose of excess area—Lands excluded upon refusal.] That before any contract is let or work begun for the construction of any reclamation project hereafter adopted the Secretary of the Interior shall require the owners of private lands thereunder to agree to dispose of all lands in excess of the area which he shall deem sufficient for the support of a family upon the land in question, upon such terms and at not to exceed such price as the Secretary of the Interior may designate; and if any landowner shall refuse to agree to the requirements fixed by the Secretary of the Interior, his land shall not be included within the projects if adopted for construction. [*38 Stat., 689.*]

Sec. 13. [Entries to be reduced to single farm units—Time for making proof—Cancellation of excess entries—Issue of patents—Assignments restricted.] That all entries under reclamation projects containing more than one farm unit shall be reduced in area and conformed to a single farm unit within two years after making proof of residence, improvement, and cultivation, or within two years after the issuance of a farm-unit plat for the project, if the same issues subsequent to the making of such proof: *Provided*, That such proof is made within four years from the date as announced by the Secretary of the Interior that water is available for delivery for the land. Any entryman failing within the period herein provided to dispose of the excess of his entry above one farm unit, in the manner provided by law, and to conform his entry to a single farm unit shall render his entry subject to cancellation as to the excess above one farm unit: *Provided*, That upon compliance with the provisions of law such entryman shall be entitled to receive a patent for that part of his entry which conforms to one farm unit as established for the project: *Provided further*, That no person shall hold by assignment more than one farm unit prior to final payment of all charges for all the land held by him subject to the reclamation law, except operation and maintenance charges not then due. [*38 Stat., 690.*]

Sec. 14. [Acceptance of extension of payments to be made within six months.] That any person whose land or entry has heretofore become subject to the reclamation law, who desires to secure the benefits of the extension of the period of payments provided by this act, shall, within six months after the issuance of the first public notice hereunder affecting his land or entry notify the Secretary of the Interior, in the manner to be prescribed by said Secretary, of his acceptance of all of the terms and conditions of this act, and thereafter his lands or entry shall be subject to all of the provisions of this act. [*38 Stat., 690.*]

Sec. 15. [General authority.] That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be

necessary and proper for the purpose of carrying the provisions of this act into full force and effect. [*38 Stat., 690.*]

Sec. 16. [Expenditures after July 1, 1915, limited to specific appropriations—To be paid out of reclamation fund.] That from and after July 1, 1915, expenditures shall not be made for carrying out the purposes of the reclamation law except out of appropriations made annually by Congress therefor, and the Secretary of the Interior shall, for the fiscal year 1916, and annually thereafter, in the regular Book of Estimates, submit to Congress estimates of the amount of money necessary to be expended for carrying out any or all of the purposes authorized by the reclamation law, including the extension and completion of existing projects and units thereof and the construction of new projects. The annual appropriations made hereunder by Congress for such purposes shall be paid out of the reclamation fund provided for by the reclamation law. [*38 Stat., 690.*]

SPECIAL PROVISIONS OF THE APPROPRIATION ACT FOR THE DEPARTMENT OF AGRICULTURE.

[Extracts from] An act making appropriations for the Department of Agriculture for the fiscal year ending June 30, 1922. (Act Mar. 3, 1921, Pub. No. 367, 41 Stat. 1315.)

* * * * * * *

General expenses, Bureau of Plant Industry.—* * * For investigations in connection with western irrigation agriculture, the utilization of lands reclaimed under the reclamation act, and other areas in the arid and semiarid regions, $94,420: *Provided,* That of this sum $11,000 shall be immediately available.

* * * * * * *

General expenses, Bureau of Soils.—* * * For examination of soils to aid in the classification of agricultural lands, in cooperation with other bureaus of the department and other departments of the Government, $15,000.

* * * * * * *

General expenses, Bureau of Public Roads.—* * * For investigating and reporting upon the utilization of water in farm irrigation, including the best methods to apply in practice; the different kinds of power and appliances and the development of equipment for farm irrigation; the flow of water in ditches, pipes, and other conduits; the duty, apportionment, and measurement of irrigation water; the customs, regulations, and laws affecting irrigation; for the purchase and installation of equipment for experimental purposes; for the giving of expert advice and assistance; for the preparation and illustration of reports and bulletins on irrigation; for the employment of assistants and labor in the city of Washington and elsewhere; for rent outside of the District of Columbia; and for supplies and all necessary expenses, $72,000.

For investigating and reporting upon farm drainage and upon the drainage of swamp and other wet lands which may be made available for agricultural purposes; for preparing plans for the removal of surplus water by drainage, and for giving expert assistance by advice or otherwise in the drainage of such lands; for conducting field experiments and investigations concerning the construction and maintenance of farm-drainage work; for investigating and developing equipment intended for the construction and maintenance of farm-drainage structures; for the purchase of material and equipment; and for preparing and illustrating reports and bulletins on drainage; and for the employment of assistants and labor in the city of Washington and elsewhere; for rent outside of the District of Columbia; and for supplies and all necessary expenses, $73,760.

* * * * * * *

Demonstrations on reclamation projects.—To enable the Secretary of Agriculture to encourage and aid in the agricultural development of the Government reclamation projects; to assist, through demonstrations, advice, and in other ways, settlers on the projects; and for the employment of persons and means necessary in the city of Washington and elsewhere, $30,000.

* * * * * * *

APPROPRIATIONS FOR RECLAMATION SERVICE.

[Extract from] An act making appropriations for the sundry civil expenses of the Government for the fiscal year ending June 30, 1922, and for other purposes. (Act Mar. 4, 1921, Public No. 389, 41 Stat. 1367.)

* * * * * * *

RECLAMATION SERVICE.

The following sums are appropriated out of the special fund in the Treasury of the United States created by the act of June 17, 1902, and therein designated "the reclamation fund," to be available immediately:

For all expenditures authorized by the act of June 17, 1902 (Thirty-second Statutes, page 388), and acts amendatory thereof or supplementary thereto, known as the reclamation law, and all other acts under which expenditures from said fund are authorized, including salaries in the District of Columbia and elsewhere; examination of estimates for appropriations in the field; refunds for overcollections hereafter received on account of water-right charges, rentals, and deposits for other purposes; printing and binding; law books, books of reference, periodicals, engineering and statistical publications, not exceeding $1,500; purchase, maintenance, and operation of horse-drawn or motor-propelled passenger-carrying vehicles; payment of damages caused to the owners of lands or private property of any kind by reason of the operations of the United States, its officers or employees, in the survey, construction, operation, or maintenance of irrigation works, and which may be compromised by agreement between the claimant and the Secretary of the Interior; and payment for official telephone service in the field hereafter incurred in case of official telephones installed in private houses when authorized under regulations established by the Secretary of the Interior.

Salt River project, Arizona: For examination of project and project accounts, $1,000.

Yuma project, Arizona-California: For operation and maintenance, continuation of construction, and incidental operations, $415,000;

Orland project, California: For operation and maintenance, continuation of construction, and incidental operations, $118,000;

Grand Valley project, Colorado: For operation and maintenance, continuation of construction, and incidental operations, $377,000;

Uncompahgre project, Colorado: For operation and maintenance, continuation of construction, and incidental operations, $214,000;

Boise project, Idaho: For operation and maintenance, continuation of construction, and incidental operations, $1,570,000, together with the unexpended balance of the appropriation for this project for the fiscal year 1921;

King Hill project, Idaho: For operation and maintenance, continuation of construction, and incidental operations, $300,000;

Minidoka project, Idaho: For operation and maintenance, continuation of construction, and incidental operations, with authority in connection with the construction of American Falls Reservoir, to purchase or condemn and to improve suitable land for a new town site to replace the portion of the town of American Falls which will be flooded by the reservoir, and to provide for the removal of buildings to such new site and to plat and to provide for appraisal of lots on such new town site and to exchange and convey such lots in full or part payment for property to be flooded by the reservoir and to sell for not less than the appraised valuation any lots not used for such exchange, $1,735,000, together with the unexpended balance of the appropriation for this project for the fiscal year 1921;

Huntley project, Montana: For operation and maintenance, continuation of construction, and incidental operations, $198,000;

Milk River project, Montana: For operation and maintenance, continuation of construction, and incidental operations, $1,017,000;

Sun River project, Montana: For operation and maintenance, continuation of construction, and incidental operations, $687,000;

Lower Yellowstone project, Montana-North Dakota: For operation and maintenance, continuation of construction, and incidental operations, $340,000;

North Platte project, Nebraska-Wyoming: For operation and maintenance, continuation of construction, and incidental operations, $2,115,000;

Newlands project, Nevada: For operation and maintenance, continuation of construction, and incidental operations, $1,448,000;

Carlsbad project, New Mexico: For operation and maintenance, continuation of construction, and incidental operations, $100,000;

Rio Grande project, New Mexico-Texas: For operation and maintenance, continuation of construction, and incidental operations, $1,900,000;

North Dakota pumping project, North Dakota: For operation and maintenance, continuation of construction, and incidental operations, $115,000;

Deschutes project, Oregon: For beginning construction and incidental operations, $400,000;

Umatilla project, Oregon: For operation and maintenance, continuation of construction, and incidental operations, $467,000;

Klamath project, Oregon-California: For operation and maintenance, continuation of construction, and incidental operations, $1,213,000;

Belle Fourche project, South Dakota: For operation and maintenance, continuation of construction, and incidental operations, $485,000;

Strawberry Valley project, Utah: For operation and maintenance, continuation of construction, and incidental operations, $144,000;

Okanogan project, Washington: For operation and maintenance, continuation of construction, and incidental operations, $33,000, together with the unexpended balance of the appropriation for this project for the fiscal year 1921;

Yakima project, Washington: For operation and maintenance, continuation of construction, and incidental operations, $2,100,000;

Riverton project, Wyoming: For operation and maintenance, continuation of construction, and incidental operations, $850,000: *Provided*, That when any land on the project is opened to homestead entry under the terms of the "reclamation law," the entryman shall pay to the United States for the lands the sum of $1.50 per acre as provided in section 2 of the act approved March 3, 1905 (volume 33, Statutes at Large, page 1016), to be credited to the fund established by said act of 1905, together with the proceeds from the sale of town sites established in said project under the "reclamation law";

Shoshone project, Wyoming: For operation and maintenance, continuation of construction, and incidental operations, $1,784,000;

Secondary projects: For cooperative and other miscellaneous investigations, $100,000;

Under the provisions of this act no greater sum shall be expended, nor shall the United States be obligated to expend, during the fiscal year 1922, on any reclamation project appropriated for herein an amount in excess of the sum herein appropriated therefor, nor shall the whole expenditures or obligations incurred for all of such projects for the fiscal year 1922 exceed the whole amount in the "reclamation fund" for that fiscal year;

Ten per centum of the foregoing amounts shall be available interchangeably for expenditures on the reclamation projects named; but not more than 10 per centum shall be added to the amount appropriated for any one of said projects;

Whenever, during the fiscal year ending June 30, 1922, the Director of the Reclamation Service shall find that the expenses of travel can be reduced thereby, he may, in lieu of actual traveling expenses, under such regulations as he may prescribe, authorize the payment of not to exceed 3 cents per mile for a motor cycle or 7 cents per mile for an automobile, used for necessary travel on official business;

All moneys hereafter received from any State, municipality, corporation, association, firm, district, or individual for investigations, surveys, construction work, or any other development work incident thereto involving operations similar to those provided for by the reclamation law shall be covered into the reclamation fund and shall be available for expenditure for the purposes for which contributed in like manner as if said sums had been specifically appropriated for said purposes;

In all, for the Reclamation Service, $20,277,000.

For reimbursement to the reclamation fund the proportionate expense of operation and maintenance of the reservoirs for furnishing stored water to the lands in Yakima Indian Reservation, Washington, in accordance with the provisions of section 22 of the act of August 1, 1914 (Thirty-eighth Statutes, page 604), there is appropriated, out of any money in the Treasury not otherwise appropriated, $11,000.

* * * * * * *

FEDERAL IRRIGATION WATER FOR DELINQUENT APPLICANTS.

Joint resolution to authorize the Secretary of the Interior, in his discretion, to furnish water to applicants and entrymen in arrears for more than one calendar year of payment for maintenance or construction charges, notwithstanding the provisions of section 6 of the act of August 13, 1914. [Res. No. 52, approved May 17, 1921, 42 Stat., —.]

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That in view of the financial stringency and the low price of agricultural products, the Secretary of the Interior is hereby authorized, in his discretion, after due investigation, to furnish irrigation water on the Federal irrigation projects during the irrigation season of 1921 to water-right applicants or entrymen who are in arrears for more than one calendar year for the payment of any charge for operation and maintenance, or any construction charges and penalties, notwithstanding the provisions of section 6 of the act of August 13, 1914 (38 Stat., p. 686): *Provided*, That nothing herein shall be construed to relieve any beneficiary hereunder from payments due or penalties thereon required by said act.

RELIEF OF EX-SERVICE MEN.

An act for the relief of certain ex-service men whose rights to make entries on the North Platte irrigation project, Nebraska-Wyoming, were defeated by intervening claims. [Act May 20, 1921, Public No. 6, 42 Stat., ——.]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the ex-service men qualified to make entry under the homestead laws, who were successful at the drawing held March 5, 1920, for farm units on the North Platte irrigation project, Fort Laramie unit, Nebraska-Wyoming, and to whom approved water-rental applications were duly issued, but who were prevented from making homestead entries for the lands covered by such applications because of the reinstatement of certain conflicting homestead entries, shall each have a preferred right of entry under the homestead laws at the next opening of lands under said project, for not less than 30 days before the date set for the opening of such lands to other entry: *Provided*, That this act shall not be considered as entitling any person to make another homestead entry who shall have received the benefits of the homestead laws since being prevented, as aforesaid, from exercising the right acquired at the said drawing on March 5, 1920.

LAW DECISIONS.

CONTRACTS.

Reclamation Service contract held good by court.—Contract dated July 1, 1918, made under the act of June 17, 1902 (32 Stat. 388), between the United States and the New York Canal Co., on behalf of its stockholders, for the furnishing of additional water to the lands of such stockholders from the Arrowrock Reservoir, Boise project, Idaho, construed and held valid, and to authorize the charges made against the company for operation and maintenance. (New York Canal Co. (Ltd.) *v.* Bond et al. (Idaho), 265 Fed. 228.)

DAMAGES.

Implied obligation of United States.—Albert J. Bothwell and the Bothwell Co. owned and utilized in their business of stock raising a large tract of land lying in Sweetwater Valley, Wyo. In June, 1909, they had confined on this land about 1,000 head of cattle. The United States condemed the land for use in connection with the construction of the Pathfinder Reservoir for the North Platte Federal irrigation project. The land was inundated by the waters of the reservoir, and it became necessary to remove the cattle and sell them at prices below their fair value. The owners claimed large damages consequent upon this forced sale of their stock and the destruction of their cattle business. Suit was brought in the Court of Claims, where this claim was disallowed, and on December 6, 1920, the judgment of the Court of Claims was affirmed by the United States Supreme Court. The Supreme Court held that there was no actual taking by the United States of the things complained of, and consequently there was no basis for an implied promise to make compensation therefor. (Bothwell et al *v.* United States, 54 Ct. Cls., 203: 228 U. S., 231.)

DEPARTMENTAL AUTHORITY.

Federal Water Power Commission.—The solicitor for the Interior Department, in an opinion dated November 6, 1920, held that the Federal Power Commission, created under the act of June 10, 1920 (41 Stat., 1063), is concerned with the administration of the public domain in those cases only where the sole use sought is the development of hydroelectric power, and does not, therefore, disturb the jurisdiction of the Secretary of the Interior as to irrigation rights of way under the acts of March 3, 1891 (26 Stat., 1101), and May 11, 1898 (30 Stat., 404), or irrigation systems constructed under authority of the act of February 21, 1911 (36 Stat., 925), since as to matters last named, the development of hydroelectric power is subordinate and auxiliary to the main purposes of irrigation. This decision arose in connection with the approval by the Secretary of the Interior of an application made by the Paradise Verde Irrigation District, in Arizona, for rights of way over public lands for its irrigation system.

Reservoir rights.—As to the Federal Government, prior to final completion of its reservoir, a water and power company, seeking to acquire title to the reservoir site under United States Revised Statutes, section 2339, was acting under a revocable permit or license, and can not be heard to complain if the permit or license was withdrawn, even if a large sum of money had been expended in the enterprise in expectation of obtaining title; and the State court, in the company's suit to quiet title to such reservoir site, can not say the Secretary of the Interior acted unjustly in making withdrawal of the site, though it may believe hardship was inflicted on the company, the Secretary's discretion being absolute in the absence of fraud. (Verde Water & Power Co. *v.* Salt River Valley Water Users' Association et al., 197 Pac., 227.)

Estimate of land that will be lost for irrigation.—In computing the acreage on which the cost of an irrigation project was to be charged, a general deduction from the lands within the limits of the project of 10,000 acres, because it was "estimated" that such quantity would prove incapable of irrigation, because rough or sandy or from seepage, *held* not justified, where no land was described and excluded, and all lands within the project were equally entitled to water if demanded, and where specific tracts had already been excluded as nonirrigable. (Payette-Boise Water Users' Association *v.* Bond et al., 269 Fed., 159.)

Settlers interest in irrigation works, and costs to be paid by them.—Settlers on lands within an irrigation project, with the understanding that water shall be supplied to

their lands and that the cost of the works will be assessed against them, are not concluded by the decision of the Secretary of the Interior as to what their interest in the works shall be, nor as to what sum shall be assessed against their lands for cost of construction, but have rights which may be judicially determined. (Payette-Boise Water Users' Association *v.* Bond et al., 269 Fed., 159.)

LANDS.

Form of patent under act of May 20, 1920.—The act of May 20, 1920 (41 Stat., 605), authorizes the Secretary of the Interior by appropriate patent to convey public lands withdrawn and improved under the act of June 17, 1902 (32 Stat., 388), when such lands are no longer needed for the purposes for which they were withdrawn and improved. Such patent should not be executed by the Secretary of the Interior but should be issued from the General Land Office under section 458 of the Revised Statutes. (Departmental Decision, Jan. 10, 1921, re Vandalia Ditch & Development Co., Milk River project.)

Right of entry.—The act of June 25, 1910 (36 Stat., 835), as amended by the act of August 13, 1914 (38 Stat., 686), provides "that where entries made prior to June 25, 1910, have been or may be relinquished in whole or in part, the lands so relinquished shall be subject to settlement and entry under the reclamation law." This amendment operates only in favor of original entrymen who became such prior to June 25, 1910, and who relinquished their entries, and of those who claim under, by, or through such original entrymen. The legislation was remedial in character and was only intended to protect from loss of improvements made to land entered by those who had been unable for one reason or another to carry their entries to patent, and hence had relinquished them. The legislation was not intended to benefit one who succeeded to no rights under an entry made prior to June 25, 1910. (Memorandum opinion, Jan. 25, 1921, of Justice F. L. Siddons, Supreme Court District of Columbia, in United States ex rel. Herbert C. Harden *v.* John Barton Payne, Secretary.)

Lands subject to the oil leasing act.—Tracts of land purchased by the United States because the same were subject to damage on account of seepage from the Nelson Reservoir of the Milk River Federal irrigation project, in Montana, are lands "owned by the United States" within the meaning of section 1 of the oil leasing act of February 25, 1920 (41 Stat., 437), and the department may issue a prospecting permit therefor under said act, subject to such terms and conditions as will protect the interests of the Government and subserve the purpose for which the tracts were purchased. (Departmental decision, Feb. 28, 1921.)

RECLAMATION FUND.

Application of moneys collected for drainage on the Boise project.—Moneys in the reclamation fund arising from operation and maintenance charges, regardless of the date of payment or collection thereof, can be made available for expenditure only in accordance with the provisions of section 16 of the act of August 13, 1914 (38 Stat., 690). Moneys paid in advance to the United States for drainage purposes under public notice of February 15, 1921, for the Boise Federal irrigation project in Idaho are not available for expenditure until specifically appropriated. (Compt. Dec., Apr. 2, 1921.)

Payment of cost of measuring and apportioning waters of St. Mary and Milk Rivers.—Officers and employees of the Reclamation Service detailed to act temporarily under the supervision of the International Joint Commission, to measure and apportion the waters of St. Mary River and Milk River in accordance with the treaty of May 13, 1910 (36 Stat., 451), with Great Britain, should be paid their compensation or salaries from the reclamation fund. If, however, there are expenses incurred by such officers and employees solely because of their work with the commission, such expenses may properly be paid from the appropriation for the support of the commission. (Comp. Dec., Apr. 15, 1921.)

Payment by Government of interest on condemnation award.—An award in condemnation proceedings, which were instituted by the United States to appropriate for reclamation purposes lands already actually taken, properly included interest at 6 per cent from the time of the actual taking to the time of the deposit of the awards in court in payment of the same, especially where such allowance of interest is in harmony with the policy of the State wherein the lands are situated. (United States *v.* Rogers, 65 L. ed., 353, affirming 257 Fed., 397).

Yuma Mesa auxiliary reclamation fund.—Under the act of January 25, 1917 (39 Stat., 868), as amended by the act of February 11, 1918 (40 Stat., 437), moneys received from the sale of public lands under the Yuma Mesa auxiliary project, in Arizona, may be utilized for the construction of the irrigation works of said project,

but reimbursement therefor must be made by the landowners to the auxiliary reclamation fund. Congress failed to make provision for the final disposition of these moneys, and they must remain in said auxiliary reclamation fund after repayment, subject to such disposition as Congress may in the future make. (Comp. Dec., May 10, 1921, and July 6, 1921.)

WATER CHARGES.

Administrative expense in relation to water charges.—While administrative expenses of the Reclamation Service, such as salaries of the administrative officers and of those who assisted them in the performance of administrative duties, are not chargeable as part of the cost of a project, the cost of services rendered to that particular project, such as the keeping of its accounts, preparation of engineering specifications or purchasing and forwarding supplies, whether such services are rendered at the place of the project or elsewhere, or for such project alone or in connection with others, in such case prorative, is properly chargeable as a part of its cost. (Payette-Boise Water Users' Association *v.* Bond, 269 Fed., 159.)

Unsettled claims in relation to water charges.—The amount of the claim of a contractor on an irrigation project, which is being contested by the Government in the Court of Claims, can not properly be charged to the settlers as a part of the cost of the project. (Payette-Boise Water Users' Association *v.* Bond. 269 Fed., 159.)

Operation and maintenance deficits prior to 1914 held collectible.—December 17, 1920, solicitor for the Department of the Interior, Charles D. Mahaffie, rendered an opinion to the effect that the operation and maintenance deficit arising on the Belle Fourche irrigation project in South Dakota prior to the enactment of the extension act of August 13, 1914 (38 Stat., 686), was not extinguished by that act and is collectible. This opinion was approved by the Secretary of the Interior on December 18, 1920, in letter transmitting the same to the Director of the Reclamation Service.

WATER RIGHTS.

Enforcement of water rights by State engineer of Washington.—The rights of an irrigation company to waters of a river having been adjudicated, pursuant to a limiting agreement which it made, by the Federal district court, and, on appeal, by the circuit court of appeals, the State hydraulic engineer, under the Water Code, has power to enforce such adjudication as against the company, the engineer not strictly enforcing the decrees of the Federal courts, but enforcing a right which the Federal courts have determined to exist. (West Side Irrigating Co. *v.* Chase, 192 Pac., 892; 196 Pac., 666. See also 230 Fed., 284; 246 Fed., 212; 264 Fed., 538.)

Seepage waters.—In the case of United States *v.* Ramshorn Ditch Co. the circuit court of appeals has affirmed (269 Fed., 80) the decision of the trial court (254 Fed., 842) sustaining the right of the Government to utilize certain seepage waters on the North Platte Federal irrigation project, in Nebraska.

LITIGATION.

[Cases initiated in the fiscal year ended June 30, 1921, marked thus: *.]

ARIZONA-CALIFORNIA, YUMA PROJECT.

Yuma Valley Water Users' Association v. *Schlecht and Caylor.*—Suit filed June 30, 1917, in United States district court for injunction to restrain Reclamation Service from enforcing construction charge of $75 per irrigable acre. Estimated amount involved $1,902,588. Case tried April 28 to June 3, 1919, inclusive. Judgment for defendants rendered February 18, 1920, and appeal has been taken by plaintiff to circuit court of appeals. Briefs filed and oral argument had May 6, 1921.

Mecca Land and Exploration Company v. *Schlecht and Priest.*—Suits filed August 10, 1918, in the superior court of Yuma County, Ariz., for injunction restraining defendants from advertising for lease or leasing certain accretion lands along the Colorado River and within the boundaries of Yuma project, Arizona. Temporary restraining order issued on filing of suit. Case removed to United States district court and answer filed. Case pending.

CALIFORNIA, ORLAND PROJECT.

United States v. *H. C. Angle and 495 others.*—Suit brought May 28, 1918, in the United States district court for adjudication of water rights on Stony Creek and tributaries and for injunction. Preliminary injunction granted June 10, 1918, and E. T. Ericksen appointed water commissioner. Amended complaint filed April 3, 1919, bringing in new parties. Twenty-three additional new parties brought in during 1921. Sixty-seven answers filed. Case pending.

COLORADO, GRAND VALLEY PROJECT.

No litigation.

COLORADO, UNCOMPAHGRE PROJECT.

United States v. *George Lang.*—Suit filed in 1912 in United States district court for the Dallas division of the northern district of Texas, to recover $7,500 upon bond of Taylor-Moore Construction Co. in connection with construction of Gunnison Tunnel Compromise settlement reached and judgment by consent entered in the amount of $3,750 on February 3, 1921, and paid. Case closed.

United States v. *George Schmucker.*—Suit filed in 1912 in United States district court for the Dallas division of the northern district of Texas, to recover $10,000 upon bond of Taylor-Moore Construction Co. in connection with construction of Gunnison Tunnel. Compromise settlement reached and judgment by consent entered in the amount of $5,000 on February 3, 1921, and paid. Case closed.

United States v. *A. F. Kirkpatrick.*—Suit filed in 1912 in United States district court for the Dallas division of the northern district of Texas to recover $5,000 upon bond of Taylor-Moore Construction Co. in connection with construction of Gunnison Tunnel. Defendant died April 15, 1919, leaving no estate, and case was dismissed by United States on February 3, 1921.

United States v. *Henry Hill, jr.*—Suit filed September 15, 1919, in the United States district court for the Dallas division of the northern district of Texas, to recover $22,500 upon the bond of Taylor-Moore Construction Co. in connection with construction of Gunnison Tunnel. Case pending.

IDAHO, BOISE PROJECT.

Farmers' Cooperative Ditch Co. v. *Riverside Irrigation District et al.*—Suit brought in August, 1902, in the State district court to adjudicate water rights in Boise River. Temporary order for irrigation season of 1920 secured from the court in July, 1920. Case pending.

Page and Brinton v. *United States.*—Petition filed February 27, 1912, in Court of Claims for $325,000 damages. Case argued on February 12, 1921. Decision by Court of Claims April 4, 1921, awarding plaintiff $50,000 damages.

Pioneer Irrigation District v. *American Ditch Co. et al.*—Suit filed July 14, 1913, in State district court for adjudication of water rights acquired after those involved in case of Farmers' Cooperative Ditch Co. *v.* Riverside Irrigation District et al. Testimony taken. Case pending.

In re Petition of Nampa & Meridian Irrigation District—Confirmation of apportionment of benefits under contract with the United States.—Proceedings brought in the State district court for confirmation of apportionment of benefits made by directors of district under contract between the United States and the district. Tried December, 1917, and January, 1918. Opinion in letter written by trial judge June 26, 1918, sustaining contention of Reclamation Service, but trial judge died shortly afterwards without signing decree. Case reargued before Judge Bryan at Caldwell, Idaho, on October 5, 1920, on transcript of testimony at previous hearing. Opinion in letter from Judge Bryan dated November 22, 1920. Case reargued as to assessments against O. O. Haga tract. Final decree signed by Judge Bryan January 7, 1921, modifying the assessment on the Haga tract, and confirming the action of the board on all other cases and all other issues. Notice of appeal to Supreme Court filed by all protestants and notice of appeal to Supreme Court (as to the modification of the Haga assessment) filed by the district. Case pending.

Payette-Boise Water Users' Association v. *D. W. Cole et al.*—Suit brought April 1, 1918, in State district court to prevent collection of construction charges announced by public notice of July 2, 1917. Case removed to Federal court and tried from January 29, 1919, to February 11, 1919. Decision of court filed July 21, 1919, holding water users must pay actual and not estimated cost and suggesting filing of statement and dedication approved by the Secretary of the Interior. (263 Fed., 734.) Certified copy of statement and conditional dedication approved by Secretary of the Interior filed October 30, 1919. After taking further testimony, a second opinion by the trial judge was rendered September 18, 1920. (269 Fed., 159.) This was largely a reaffirmance of the former opinion, the court suggesting that the parties get together and come to a settlement of their dispute and negotiations toward this end are now pending.

United States v. *William C. H. Young et al.*—Suit filed on January 16, 1919, in the United States district court to condemn right of way for Notus Canal for first subunit of the Black Canyon unit of the Boise project, right to condemn being contested on ground that the Service has no authority to irrigate private lands. Decision rendered by the court November 5, 1919, sustaining the right of the Government to condemn. Stipulation and contract signed by defendants agreeing to permit United States to revert to location for canal described in the original complaint on the payment of an additional $180 on July 1, 1920. Final order of condemnation covering last agreement signed by court July 12, 1920. Case closed. Case combined in opinion with Griffiths *v.* Cole and reported in 264 Fed., 369.

Idaho Power Company v. *United States.*—Suit filed on June 18, 1919, in the district court of the United States, district of Idaho, under the Tucker Act, to recover $2,550, the alleged value of certain transformers leased by the United States from the company and destroyed by fire. Compromise agreed upon and contract signed under which the United States agrees to pay to plaintiff one-half the value of the transformers ($1,275) in settlement of claim. Plaintiff paid by check on October 7, 1920, and case closed.

New York Canal Company, Limited, v. *J. B. Bond and Charles F. Weinkauf. (Operation and maintenance charges under contract of July 1, 1918.)*—Suit filed on July 23, 1919, in the State district court for the construction of contract between the company and the United States, plaintiff claiming it should pay only $2,346.34 maintenance instead of $10,271.14. Case removed to Federal court and decision was rendered November 12, 1919, holding that the maintenance charge claimed by the Government officers is correct. On appeal, decree of district court affirmed by the United States circuit court of appeals on May 10, 1920. Petition for rehearing filed by plaintiff denied July 6, 1920, and case closed. Case reported in 265 Fed., 228.

Oliver O. Haga v. *Nampa & Meridian Irrigation District (in Ada County district court).*—Suit filed on October 27, 1919, by plaintiff to enjoin Nampa & Meridian Irrigation District from assessing plaintiff's land for the payment for a Government water right. Case argued December 14, 1920, and decision filed December 31, 1920, holding district assessment prior to confirmation of apportionment of benefits by the court is not valid.

Payette-Boise Water Users' Association v. *Riverside Irrigation District et al.*—Suit filed on March 11, 1920, in district court of the United States, district of Idaho, testing the validity of certain contracts between the United States and various irrigation districts and irrigation companies for the sale of storage rights in Arrowrock Reservoir. Stipulation entered that evidence presented in case of Payette-Boise Water Users'

Association *v.* D. W. Cole et al should also be considered to be in evidence in this case. Case pending.

New York Canal Company, Limited, v. *J. B. Bond and Charles F. Weinkauf. (Operation and maintenance charges under contract of March 3, 1906.)*—Suit filed on April 15, 1920, in the State district court, district of Idaho, for the construction of contract, dated March 3, 1906, between the New York Canal Co. and the United States, plaintiff claiming operation and maintenance charges levied against plaintiff's shareholders is excessive. Case removed to Federal court and tried on May 9, 1921. Decision by court dated May 24, 1921, holding that charge made against shareholders of plaintiff by Secretary of the Interior was lawful and proper and that there is no merit in contention of plaintiff. Decree dismissing bill of complaint filed June 4, 1921.

**United States* v. *Oliver O. Haga & Jennie E. Haga.*—Suit filed by the United States on July 7, 1920, to enjoin defendant from diverting waste water flowing into channel of Eight Mile Creek from lands irrigated from Government canal system of Boise project. Tried May 5, 6, and 7, 1921. Case pending

**Oliver O. Haga* v. *J. B. Bond and Payette-Boise Water Users' Association.*—Suit filed July 16, 1920, to require defendants to deliver water to lands of plaintiff. Case removed to Federal court July 31, 1920. Motion for injunction requiring plaintiff to dismiss case filed July 30, 1920. Order entered by court on August 10, 1920, denying defendant's motion for injunction and requiring plaintiff to pay all charges for years 1917, 1918, and 1919 as condition to receiving water pending the final decision of the case. Case tried May 10, 1921. Briefs filed. Case pending.

IDAHO, KING HILL PROJECT.

In re petition King Hill Irrigation District for confirmation of apportionment of benefits under contract with the United States.—Suit filed in the State district court for Elmore County on November 5, 1918, for confirmation of apportionment of benefits under contract between the district and the United States. Case tried before the court at Mountain Home, Idaho, on December 9 and 10, 1919. Opinion rendered by court April 14, 1920, confirming apportionment of benefits. Notice of appeal filed by defendants on August 18, 1920. Case pending in Supreme Court.

In re petition of King Hill Irrigation District for confirmation of proceedings in connection with the election and authorization of supplemental contract between the King Hill Irrigation District and the United States.—Petition for confirmation of proceedings in connection with the election and authorization of supplemental contract between the district and the United States filed May 7, 1920. Case heard before the district court at Hailey, Idaho, on July 10, 1920. Order of default entered July 10, 1920. Decree of court secured on July 14, 1920, confirming the legality and regularity of the proceedings in connection with the proposed supplemental contract and the election authorizing the same.

**In re petition of King Hill Irrigation District for confirmation of apportionment of benefits under contract between the King Hill Irrigation District and the United States dated June 17, 1920.*—Suit filed in the State district court for Elmore County in July, 1920, for confirmation of apportionment of benefits under supplemental contract dated June 17, 1920, between the district and the United States. Case tried before the court at Mountain Home, Idaho, on September 10, 1920, and case submitted to court. Final decree entered confirming apportionment made by the board of directors.

IDAHO, MINIDOKA PROJECT.

**United States* v. *George H. Schodde et al.*—Suit filed in the district court of the United States, district of Idaho, in September, 1920, for the collection of $1,855 and interest due on December 1, 1919, as rental under grazing lease. Case tried on March 3, 1921, and judgment entered on March 7, 1921, in favor of the plaintiff for the sum of $1,855 and interest thereon at 10 per cent per annum from December 1, 1919, amounting in all to $2,086.87.

**United States* v. *Dewitt Garrison Brown et al.*—Suit filed on June 17, 1921, in the district court of the United States, district of Idaho, to condemn lands required by the United States in connection with the construction of the proposed American Falls Reservoir. Case pending.

MONTANA, BLACKFEET (INDIAN) PROJECT.

No litigation.

MONTANA, FLATHEAD (INDIAN) PROJECT.

**Lulu G. Allard* v. *C. J. Moody, project manager.*—Complaint in equity filed in the district court of the United States for the district of Montana on April 21, 1921. Asks decree and adjudication of waters of Big and Ducharme Creeks as between the United States and plaintiff and seeks to enjoin and restrain defendant from using water from said creeks claimed by plaintiff through appropriation made under the State law and for such damages, costs expended, and such other general relief as deemed just and equitable. Answer filed June 15, 1921, denies right of court to determine or restrict rights of the United States in this suit and asks that complaint be dismissed at plaintiff's cost. Case pending.

**United States* v. *William E. Long and Olle V. McIntire.*—Suit brought on May 26, 1921, in the United States district court for the district of Montana to recover $462.13 plus penalties, for irrigation water furnished to land leased by William E. Long during the season of 1914. Olle V. McIntire was sued with Mr. Long as surety on bond furnished at the time of applying for irrigation water. Proceedings suspended on request of attorney for defendant McIntire pending settlement and adjustment.

**United States* v. *Eleanor Cox Bailey.*—Suit brought on May 27, 1921, in the United States district court for the district of Montana to recover delinquent water-rental charges, aggregating $95.32 plus penalties. Case pending.

MONTANA, FORT PECK (INDIAN) PROJECT.

No litigation.

MONTANA, HUNTLEY PROJECT.

**United States* v. *R. A. Larimer.*—Suit brought on May 26, 1921, in the United States district court for the district of Montana to recover $409.17, with interest at 6 per cent per annum, for delinquent installments under two leases of first form withdrawn land each dated June 2, 1917.

MONTANA, MILK RIVER PROJECT.

United States v. *C. E. Fowlie.*—Suit brought April 16, 1920, in the United States district court for district of Montana, for the recovery of $580 for lease of lands. Judgment secured May 20, 1920, for $580 plus $36.25 interest and costs amounting to $51.66. Satisfaction of judgment not yet reported.

MONTANA, ST. MARY STORAGE DIVISION.

United States v. *Frank M. Stevenson and wife; M. D. Cassidy and wife; and Cassidy Swift-Current Oil Company.*—In the United States district court for Montana. Filed July 10, 1919, for condemnation of land. Decree rendered January 22, 1920, awarding $17,075 and interest for the 535.45 acres involved, and payment was made February 27, 1920. Quitclaim deeds have been executed by M. D. Cassidy and the Swift-Current Oil Co. Receipt of attorneys of above sums in full satisfaction of judgment procured and filed with clerk of court February, 1921.

MONTANA, SUN RIVER PROJECT.

United States v. *William B. Orser.*—Suit to collect $1,190.80 unpaid water charges was filed in the district court, district of Montana, on August 15, 1916. Judgment was not entered and an amended complaint covering delinquent charges to date ($1,641.02) was filed in June, 1918. Defendants filed demurrer, which was overruled and judgment on the pleadings was entered July 13, 1919. The amount of this judgment, however, was erroneously computed at $267.56 and costs, and upon application, amended judgment was entered January 22, 1920, and alias execution issued to collect the remainder of the judgment, amounting to $2,056.59, interest and accrued costs. Before levy was made Mr. Orser had disposed of his property, and collection of the remainder of the judgment has not yet been made.

United States v. *Henry F. Holmes.*—Suit filed on September 24, 1919, in the United States district court of Montana, to recover $95 delinquent water-right charges. Prior to service further charges amounting to $91.20 became delinquent. On April 26, 1920, defendant paid these charges, plus penalties, and action on the suit was suspended.

United States v. *A. S. Hayden.*—Suit filed in the United States district court in November, 1919, for recovery of $90 due the United States for plowing done under

contract. December 29, 1919, defendant answered, alleging defective and inefficient work. The case was tried September 17, 1920, and resulted in a verdict for the defendant.

**United States* v. *J. A. Goolsbay.*—Suit brought on May 26, 1921, in the United States district court for the district of Montana to recover $61.35, together with interest at the rate of 6 per cent per annum from July 26, 1917, being the amount due the Government under a contract dated June 25, 1917, with the Reclamation Service for plowing defendant's land on the Sun River project. Answer filed June 17, 1921.

**United States* v. *W. R. Van Wert.*—Suit brought in the district court of the United States for the district of Montana June 2, 1921, to recover $150 plus interest due under lease of land for agricultural purposes dated May 19, 1917. After complaint was field it was discovered that Mr. Van Wert had become a resident of Oregon. United States attorney for district of Montana was authorized to dismiss the suit and transfer the case to the United States attorney for the district of Oregon.

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

Widell-Finley Company et al. v. *United States.*—Suit filed February 9, 1912, in Court of Claims for $226,852.02, account contract Belle Fourche project, South Dakota. United States filed counterclaim of $86,000 on account excess cost to the United States over contract price on lower Yellowstone project. On January 26, 1920, judgment entered in favor of trustee in bankruptcy of the Widell-Finley Co. in the sum of $37,628.19, and on April 26, 1920, Court of Claims allowed appeal by United States to the Supreme Court.

United States v. *Ole Olson.*—Suit brought on February 25, 1919, in the United States district court for district of Montana, to recover $2,553.07 delinquent water-right charges. Olson thereafter accepted the terms of water-rental order of March 31, 1919, and made payment of costs in the sum of $19.15, and the suit was dismissed on July 8, 1919. Thereafter it was discovered that the marshal's fees of $28.89 had not been included in statement of costs and the case is still pending as to this feature.

United States v. *Josephine Olson.*—Suit brought on February 25, 1919, in the United States district court for district of Montana, to recover $2,954.15 delinquent water-right charges. Mrs. Olson thereafter accepted the terms of water-rental order of March 31, 1919, and made payment of costs in the sum of $19.15, and the suit was dismissed on July 8, 1919. Thereafter it was discovered that the marshal's fees of $28.89 had not been included in statement of costs and the case is still pending as to this feature.

United States v. *Great Northern Railway Company.*—Suit filed August 1, 1919, in district court of the United States, district of Montana, for $940 on account damage to property of the United States by fire set by sparks from defendant's locomotive on November 13, 1917. Compromise agreement reached and case closed, July 13, 1920, upon payment by defendant of $610 and costs.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

Albert J. Bothwell and Bothwell Co. v. *United States.*—Petition filed in Court of Claims June 9, 1915, for $125,000, covering damage to hay flooded, loss on pure-bred cattle sold as beef cattle and loss of pure-bred cattle business, account Pathfinder Reservoir flooding condemned ranch. Amended petition filed February 5, 1916; amendment to amended petition filed May 26, 1916. Judgment rendered for plaintiff December 2, 1918, for $5,150. Appeal by plaintiff and on December 6, 1920, Supreme Court affirmed decision of Court of Claims. (254 U. S., 231.)

United States v. *Ramshorn Ditch Co.*—Suit for injunction filed in United States district court August 21, 1917, to restrain State engineer and Ramshorn Ditch Co. from diverting approximately 40 second-feet of recaptured seepage water. The court held on December 14, 1918, that defendant was not entitled to appropriate the seepage water escaping from the Government canal. Upon appeal the United States circuit court of appeals on November 15, 1920, affirmed decision of the district court. No appeal has been yet perfected from this decision.

**Laura S. T. Cox* v. *United States.*—Suit filed December 20, 1920, in State district court, Scottsbluff County, to restrain officials of the United States from entering into a lease contract on certain lands claimed as a homestead by plaintiff. Upon the allowance of the homestead on appeal to the Secretary of the Interior, the suit was dismissed.

NEVADA, NEWLANDS PROJECT.

State of California v. *The Truckee River General Electric Company, A. P. Davis, et al.*—Suit to determine ownership of State in lands below high-water mark, Lake Tahoe.

and for removal of outlet dam. Brought in State court, Placer County, Calif., and removed to United States district court. Suit dismissed January 20, 1919, for lack of prosecution; order of dismissal qualified by statement permitting reinstatement on proper showing or upon stipulation. July 1, 1919, attorney general for the State of California filed motion for reinstatement, which was granted August 28, 1919. Case pending.

The Western Company v. *The Truckee River General Electric Company et al.*—Suit brought September 24, 1912, in the United States district court to enjoin changing level of Lake Tahoe. Dismissed November 18, 1920, under rule of court for lack of prosecution.

United States v. *Orr Water & Ditch Co.*—Suit filed March 3, 1913, in the United States district court for the adjudication of water rights on Truckee River and tributaries. Trial started August 4, 1919, and taking of testimony completed, but decree not as yet entered.

Nellie Copeland v. *Arthur L. Smith.*—Suit filed June 4, 1919, in State court, San Francisco, Calif., against representatives of United States Reclamation Service for damages for flooding of land and property bordering on Lake Tahoe. Removed to United States district court August 28, 1919. Amount involved, $3,500. Demurrer overruled November 8, 1920. Answers filed February 1, 1921. Consolidated for trial with the three cases next described. Trial May 31 and June 1, 1921. Plaintiff nonsuited. Judgment for defendant. Pending on motion for new trial.

Hartland Law v. *Arthur L. Smith.*—Suit filed at same time and for same purpose and in the same status as case next above noted. Amount involved, $5,000.

Melville W. Lawrence et al. v. *Arthur L. Smith.*—Suit filed at same time and for same purpose and in the same status as case of Nellie Copland *v.* Arthur L. Smith noted above. Amount involved, $5,000.

Eugene D. N. E. Lehe v. *Arthur L. Smith.*—Suit filed at same time and for same purpose and in the same status as case of Nellie Copland *v.* Arthur L. Smith noted above. Amount involved, $3,500.

W. R. Young et al. v. *Arthur L. Smith.*—Suit filed at same time and for same purpose as case of Nellie Copland *v.* Arthur L. Smith noted above. Amount involved, $5,000. Demurrer overruled November 8, 1920. Answer filed February 1, 1921. Dismissed on motion of plaintiff May 31, 1921.

John E. Bennett v. *United States.*—Suit filed September 10, 1919, in United States district court to recover payment for services rendered United States at instance and request of the Reclamation Service in clearing titles to land riparian to Lake Tahoe. Trial on November 12, 1920, without jury, and judgment rendered for defendant.

United States v. *Williams Estate Company.*—Suit filed in January, 1920, in United States district court for condemnation of land in the town of Fallon, Nev., for use as a warehouse site. Amount involved, $4,500. Judgment rendered upon stipulation and payment made.

NEW MEXICO, CARLSBAD PROJECT.

United States v. *J. J. Alexander.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Chas. A. Bigelow et al.*—In United States district court for New Mexico. Filed January 15, 1915, for condemnation of land and other rights. Amount involved estimated, round numbers, at $160,000. Certain features of case settled by payment under judgments dated January 30, 1918. Other features, involving approximately $65,000, argued and submitted and now under consideration by district court.

United States v. *H. A. Bock.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *E. C. Cook et al.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *John Carothers et al.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved

indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Clara E. Courtney.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Frank Edwards.*—In United States Circuit Court of Appeals, Eighth Circuit. Appealed July 19, 1918, from United States district court for New Mexico. In matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *John Fidell.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Mary Fidell.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *E. F. Hardwick.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Margie L. Highsmith.*—In United States Supreme Court. Writ of error from Supreme Court to United States Circuit Court of Appeals, Eighth Circuit, allowed June 23, 1919, to review decision of latter court affirming judgment of United States district court for New Mexico, allowing interest on the principal sum awarded by jury. Decision affirmed by Supreme Court February 28, 1921. (254 U. S., —.)

United States v. *Mrs. Marshall K. Holt.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Herbert Litton.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Don F. Lyman.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Amie D. McHenry.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *R. W. Rankin.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *I. C. Roberts.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *W. L. Rogers et al.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *William E. Rogers et al.*—In United States Supreme Court. Writ of error from Supreme Court to United States Circuit Court of Appeals, Eighth Circuit, allowed June 23, 1919, to review decision of latter court affirming judgment of United States district court for New Mexico, allowing interest on principal sum awarded by jury. Decision affirmed by Supreme Court February 28, 1921. (254 U. S., —.)

United States v. *John W. Sanner et al.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *C. Bert Smith.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *H. E. Steadman.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *E. H. Vance.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *C. E. Vaughn.*—In United States Circuit Court of Appeals, Eighth Circuit. Appeal July 19, 1918, from United States district court for New Mexico, in matter of interest on award in condemnation suit. Amount involved indeterminate. Case dismissed April 30, 1921, account decision of the United States Supreme Court in a test case involving the same points.

United States v. *Hope Community Ditch et al.*—In United States district court for New Mexico. Adjudication of water rights of Pecos River and tributaries. Filed January 24, 1920. Service being secured on the 2,500 defendants and hydrographic survey by State engineer in course of preparation.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

El Paso Valley Water Users' Association v. *W. H. Austin et al.*—In United States district court, western district of Texas. Suit filed April 29, 1912, for adjudication of water rights of Rio Grande in Texas. Case pending. Amount involved indeterminate.

Oscar C. Snow v. *Francisco Abalos et al.*—In district court for third judicial district of New Mexico. Suit filed October 24, 1912, for adjudication of water rights of Rio Grande in Texas. Amount involved indeterminate. Case pending.

United States v. *A., T. & S. F. Ry. Co.*—In United States district court for New Mexico. Suit filed October 29, 1915, for condemnation of land and other property required for right of way. Amount involved indeterminate. Case will be dismissed under compromise agreement.

Nellie D. Sperry v. *Chamberino Community Ditch Co. et al.*—In district court, third judicial district of New Mexico. Suit filed March 31, 1916, against employees of the Reclamation Service and others seeking injunction against operation of a certain flume account alleged defective construction, and asking for $5,000 damages. Injunction denied, but case pending on claim for damages.

United States v. *Elmer C. Beezly.*—In United States district court for western district of Texas. Suit filed October 13, 1917, for condemnation of land required as right of way. Amount involved $60 and certain legal questions not monetary. Compromise agreement has been reached and case will be dismissed when title has been approved and payment made.

United States v. *W. F. Payne.*—In district court for western district of Texas. Suit filed October 13, 1917, for condemnation of land required as right of way. Amount involved $326 and certain questions not monetary. Compromise agreement has been reached and case will be dismissed when title has been approved and payment made.

El Paso Valley Water Users' Association v. *H. S. Bozarth et al.*—In forty-first district court of El Paso County, Tex. Suit filed October 15, 1918, to restrain defendants from interfering with United States in construction of canal and lateral across defendants' land claimed under grant of right of way contained in stock subscription contract with the association. Temporary restraining order was issued. Compromise agreement

was reached on basis of Government's original offer and suit will be dismissed when title is approved and payment made. Amount involved $159.50.

* *United States* v. *J. M. Fox et al.*—In United States district court for the western district of Texas. Suit for condemnation of land filed October 16, 1920. Commissioners supplementary award of $550 filed November 4, 1920, and final order and decree entered December 1, 1920.

* *United States* v. *Tomasa G. Giron.*—In justice of peace court, precinct No. 4, El Paso County, Tex. Summary proceedings for seizure of crops under distress warrant for collection of water charges amounting to $559.88. Filed October 28, 1920, and crops seized same date. Case settled by adjustment of water charges.

* *United States* v. *L. L. Stallings.*—In justice of peace court, precinct No. 2, El Paso County, Tex. Summary proceeding for seizure of crops on which lien held for payment of water charges in sum of $241.29. Filed October 30, 1920, and crops seized same date. Case settled on payment by defendant of all charges due and costs.

**Ex Parte El Paso County Water Improvement District No. 1.*—In sixty-fifth district court, El Paso County, Tex. Suit for confirmation of district organization, contract with United States and other matters. Filed December 10, 1920. Decree in confirmation entered April 6, 1921, amount involved under contract $4,941.00.

* *United States* v. *J. M. Wyatt.*—In United States district court for western district of Texas. Suit for collection of water charges in sum of $2,048.79 and for writ of sequestration covering crops under lien for charges. Filed January 8, 1921. Suit dismissed upon payment by defendant of all charges and costs.

**Santo Tomas Farms Company* v. *Elephant Butte Irrigation District et al.*—In district court for third judicial district of New Mexico. Suit filed February 23, 1921, to restrain project manager and others from withholding water from plaintiff and to require the continuance of drainage work for benefit of plaintiff. Temporary injunction issued March 2, 1921. Petition and bond for removal to United States district court filed, but before formal removal case settled on payment by plaintiff of water charges due and satisfactory adjustment of other differences.

**El Paso County Water Improvement District No. 1* v. *Owen, Wilson & Owen.*—In forty-first district court, El Paso County, Tex. Suit to enjoin unlawful use of water from project system. Filed April 25, 1921. Temporary restraining order issued April 26, 1921, and suit dismissed April 27, 1921, upon payment of costs by defendants, who executed proper contract for water service. Amount involved indeterminate.

**State of New Mexico* v. *Casimiro Aragon et al.*—In justice of peace court, Don Ana County, N. Mex. Preliminary hearing May 27, 1921, on complaint for theft of automobile parts and attachments, the property of the Reclamation Service. Defendants bound over under bond of $500 to await action of grand jury.

**State of New Mexico* v. *Rosario Herrera.*—In justice of peace court, Dona Ana County, N. Mex. Complaint filed May 30, 1921, against ditch rider of Reclamation Service for unlawfully cutting off water of complainant. Complaint made by justice of the peace himself, and on change of venue case was dismissed on ground that complaint was not properly made and did not denounce an act which constitutes a crime under the law.

**State of New Mexico* v. *N. W. Osborne.*—In justice of the peace court, Dona Ana County, N. Mex. Complaint filed June 30, 1921, against defendant on account of unlawful and unauthorized use of water from project system. Defendant demanded trial by jury, which was unable to agree, and case dismissed.

NORTH DAKOTA, NORTH DAKOTA PUMPING PROJECT.

No litigation.

OREGON, UMATILLA PROJECT.

No litigation.

OREGON-CALIFORNIA, KLAMATH PROJECT.

United States v. *J. P. Harter.*—In the United States district court for northern California. Filed March 15, 1918. Ejectment suit. Amount involved indeterminate. Issues made up, and case is pending.

City of Klamath Falls v. *Klamath Canal Company, Klamath Water Users' Association, and J. B. Bond.*—In the circuit court of the State of Oregon for Klamath County. Answer on behalf of J. B. Bond filed by United States district attorney and district counsel on August 19, 1918. Suit to recover possession of canal right of way over streets of the city. Case is ready for trial.

Geary Investment Company et al. v. *California-Oregon Power Company.*—Suit instituted in the United States district court for Oregon to enjoin the building by the lat-

ter company of a restraining dam at the outlet of Upper Klamath Lake. Parties entered into a stipulation, on July 19, 1920, to have suit dismissed. Intervention by the United States was probable had the case been tried.

**George W. Courtright* v. *Herbert D. Newell and Clarence Vochatzer.*—In the circuit court of the State of Oregon for Klamath County. Action filed October 28, 1920, for damages on account of injuries to a band of horses. Answer on behalf of defendant Herbert D. Newell filed by district counsel on November 4, 1920. Amount involved indeterminate. Case tried April 9, 1921, resulting in a disagreement by the jury. Dismissed June 14, 1921, on stipulation providing that each party pay own costs.

**United States* v. *N. H. Bogue et ux.*—Petition filed June 22, 1921, in United States district court for Oregon, for condemnation of land. Amount involved indeterminate. Case pending.

**United States* v. *C. W. Bailey et ux.*—Petition filed June 22, 1921, in United States district court for Oregon, for condemnation of land. Amount involved indeterminate. Case pending.

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

Widell-Finley Co. et al. v. *United States.*—Suit filed in Court of Claims, February 9, 1912, for $226,582.02, covering disputed classification material, extra work, etc. Judgment for plaintiff entered January 26, 1920, in the sum of $37,628.19, and on April 26, 1920, Court of Claims allowed appeal by United States to Supreme Court.

United States v. *John P. Wilson, guardian of Russell H. Wilson, minor.*—Suit filed in January, 1920, in United States district court of South Dakota for $604.85 and penalties, covering water-right charges for construction and operation and maintenance. Trial set for the September term of court, 1921.

**United States* v. *T. J. Donahue and Gus Murray.*—Suit for injunction filed in October, 1920, in the United States district court of South Dakota to restrain defendants and their agents from pumping water from above the diversion dam constructed by the United States. Trial set for the September term of court, 1921.

UTAH, STRAWBERRY VALLEY PROJECT.

In re petition of Mapleton Irrigation District.—Proceedings brought in State district court for confirmation proceedings in connection with election and authorization of contract dated October 28, 1919, between Mapleton Irrigation District and the United States for purchase of 467 acre-feet of water. Decree granted July 20, 1920.

In re petition of Springville Irrigation District.—Proceedings brought in State district court for confirmation of proceedings in connection with election and authorization of contract dated April 9, 1920, between Springville Irrigation District and the United States for purchase of 2,000 acre-feet of water. Decree granted July 6, 1920.

WASHINGTON, OKANOGAN PROJECT.

Town of Okanogan v. *United States and Calvin Casteel.*—Suit brought in the United States district court for the eastern district of Washington for injunction restraining the defendants from cutting off water supply from Shull Springs. Suit involves the interpretation of a water contract dated December 3, 1909. Dismissed October 22, 1918, and case closed.

United States v. *Charles Hermann et al.*—Petition filed August 4, 1919, in the district court of the United States for the eastern district of Washington, northern division, for the condemnation of certain town lots in the town of Conconully, Wash. Case settled by execution of land-purchase agreement between the parties dated March 25, 1920.

United States v. *C. P. House et al.*—Petition filed in February, 1920, for condemnation of land. Stipulation filed April 1, 1920, allowing United States to enter upon the right of way desired and continue with the construction work. Amount involved indeterminate. Case tried April 8, 1921, and jury refused to allow damages to defendants and decree in accordance with verdict entered April 16, 1921.

WASHINGTON, YAKIMA PROJECT.

United States v. *West Side Irrigation Company.*—Action brought June 25, 1912, in United States district court, for injunction, which was granted February 19, 1916. Upon appeal, the circuit court of appeals on October 15, 1917, affirmed the judgment of district court. (246 Fed., 212.) On September 3, 1919, the circuit court of appeals

granted the West Side Irrigation Co. permission to file a petition in the district court for a review and rehearing of the cause upon the ground of newly discovered evidence. The said petition having been filed, the United States filed motion to dismiss. Case heard March 23, 1920, and the Government's motion for dismissal of the company's petition was sustained. Appeal filed by company on July 1, 1920, to the circuit court of appeals, which court on January 3, 1921, affirmed the action of the lower court and the decree of February 19, 1916. (269 Fed., 759.)

WYOMING, SHOSHONE PROJECT.

Lincoln Land Company et al. v. *Frank E. Weymouth and Geo. O. Sanford* (*The United States*).—Suit brought in the district court of the United States for the district of Wyoming July 2, 1918, for an injunction against the diversion and use by the United States of the waters of Bitter Creek. Answer filed by the United States praying for an injunction against interference by the defendants with the irrigation or drainage works of the United States. Hearing at Cheyenne, Wyo., on January 28 to 31, 1919. The matter taken under advisement by the court. Plaintiff and defendants filed briefs. Conditional decree entered November 20, 1919, declaring Bitter Creek a natural stream and giving the United States 30 days within which to convey to plaintiff perpetual water right, failing which the United States to be perpetually enjoined from interfering with plaintiff's use of water from Bitter Creek. Injunction made final on December 20, 1919. Appeal to circuit court of appeals filed by defendants on May 21, 1920, and it is expected that the appeal will be heard at the September, 1921, term at Denver, Colo.

United States v. *Arthur W. Ide, Grant Caldwell, and H. B. Loomis.*—Suit brought in the district court of the United States for the district of Wyoming July 3, 1918, for an injunction against interference by the defendants with the operations of the United States in constructing irrigation and drainage ditches across the lands of the defendants. Hearing had at Cheyenne, Wyo., January 28 to 31, 1919, inclusive. Conditional decree entered on November 20, 1919, declaring Bitter Creek a natural stream and awarding to defendants $3,150 and interest as damages, also giving the United States 30 days within which to convey to defendants perpetual water right, failing which the United States to be perpetually enjoined from interfering with defendants use of water from Bitter Creek. Injunction made final on December 20, 1919. Appeal to the circuit court of appeals filed by United States on May 21, 1920, and it is expected that the appeal will be heard at the September, 1921, term at Denver, Colo.

United States v. *L. E. Pratt.*—Suit instituted in United States district court of Wyoming June 12, 1920, for the collection of $13.09 for seed wheat sold to defendant and $20 on account of overpayment made to defendant for meals furnished to employees of the United States. Action suspended pending possible payment of the $20.

United States v. *The Lincoln Land Company.*—Suit filed June 15, 1920, in United States district court of Wyoming for condemnation of 0.5 of an acre of land required for canal rider's station. Application for appointment of commissioners and for immediate possession filed on the same day. Order granting immediate possession signed June 17, 1920. Decree signed August 23, 1920, and awarding $45 to the defendants for the land condemned. The commissioners were awarded $6 each to be taxed as costs and paid by the United States. Thereafter, on October 1, 1920, the court issued a further order allowing one of the commissioners the sum of $12.50 expenses incurred as appraiser, to be taxed and paid by the United States.

PURCHASES OF RIGHTS AND PROPERTY.

The following purchases of rights and property were made during the fiscal year ending June 30, 1921:

Purchases of rights and property.

ARIZONA, SALT RIVER PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Alkire, Geo. A., et ux	Ditch and right of way in S. ½ sec. 21, T. 2 N., R. 1 E., S. R. B. and M.	$1.00	Mar. 1, 1921
Anderson, D. L., et al	Right of way in N. ½ sec. 30, T. 3 N., R. 2 E	1.00	[1] June 6, 1920
Austin, W. S., et ux	Right of way in NE. ¼ sec. 30, T. 1 S., R. 4 E	1.00	Apr. 7, 1921
Bailey, S. E., et ux	Right of way in NE. ¼ sec. 35, T. 1 S., R. 4 E	1.00	Do.
Bailey, Wm. H	Right of way in S. ½ NW. ¼ sec. 18, T. 3 N., R. 2 E	1.00	[1] June 6, 1920
Bartlett Heard Land & Cattle. Co.	Ditch and right of way in NE. ¼ sec. 25, T. 1 N., R. 3 E.	1.00	[1] Sept. 16, 1920
Bowser, Jacob, et al	Right of way in sec. 23, T. 2 N., R. 1 E	1.00	Feb. 3, 1921
Bradshaw, John R., et al.	Right of way in S. ½ and SW. ¼ sec. 16, and ditch in NW. ¼ sec. 21, T. 1 N., R. 2 E.	1.00	[1] May 17, 1920
Brooks, Z. M., et at	Right of way in SW. ¼ NE. ¼ sec. 21, T. 1 S., R. 4 E	1.00	[1] Feb. 1, 1920
Cochran, J. A., et al	Right of way and easement in NW. ¼ sec. 9, T. 2 N., R. 1 E.	1.00	Aug. 17, 1920
Cope, Alice G	Right of way and easement in SW. ¼ NE. ¼ sec. 17, T. 1 N., R. 3 E.	1.00	[1] Apr. 10, 1920
Cowden, Minnie Reed, et al.	Ditch and right of way in W. ½ NW. ¼ sec. 8, T. 1 N., R. 1 E.	1.00	July 29, 1920
Cummard, John, et ux	Right of way and ditch in E. ½ NW. ¼ sec. 19, T. 1 S., R. 6 E.	1.00	Sept. 23, 1920
Davis, Hugh C., et ux	Ditch and right of way in N. ½ sec. 18, T. 2 N., R. 3 E	1.00	Dec. 20, 1920
Davisson, Chas. W., et al.	Ditch and right of way in NE. ¼ sec. 3, T. 1 S., R. 5 E	1.00	[1] Oct. 4, 1919
Ethington, P. P., et ux	Right of way in NW. ¼ NE. ¼ sec. 23, T. 1 S., R. 5 E	1.00	[1] Mar. 1, 1920
Fowler, R. A., et al	Right of way in W. ½ sec. 22, T. 2 N., R. 3 E	1.00	Jan. 26, 1921
Gilmore, Harry A	Right of way in W. ½ sec. 4, NE. ¼ NE. ¼ sec. 5, T. 2 N., R. 1 E.	1.00	[1] May 10, 1920
Green, Wm. T., et ux	Right of way in S. ½ SW. ¼ sec. 28, T. 2 N., R. 6 E	1.00	[1] June 29, 1920
Hall, H. M., et ux	Right of way and easement in SE. ¼ sec. 25, T. 1 N., R. 5 E.	1.00	Nov. 24, 1920
Heard, J. S., et al	Ditch and right of way in SW. ¼ sec. 23, T. 2 N., R. 3 E.	1.00	Sept. 10, 1920
Huber, J. E., et al	Ditch in SE. ¼ sec. 19, and E. ½ sec. 30, T. 1 S., R. 5 E	1.00	[1] May 12, 1920
Huber, Lola V., et vir	Right of way in E. ½ sec. 30, T. 1 S., R. 5 E	1.00	Nov. 9, 1920
Johnston, W. R., et al	Right of way in E. ½ sec. 8, T. 2 N., R. 1 E	1.00	[1] June 2, 1920
Lacy, P. S., et al	Right of way in S. ½ secs. 16 and 17, T. 1 S., R. 6 E	1.00	[1] Mar. 1, 1920
Lentz, Olga H., et al	Right of way in SW. ¼ SE. ¼ sec. 3, T. 2 N., R. 2 E	1.00	[1] Mar. 5, 1920
Ludden, Homer C., et al.	Ditch and right of way in N. ½ SE. ¼ sec. 35, T. 3 N., R. 1 E.	1.00	Aug. 7, 1920
Marlette, S. R., et al	Right of way in E. ½ SW. ¼ sec. 7, T. 2 N., R. 3 E	1.00	Oct. 2, 1920
Mets, Leonard, et ux	Right of way in NW. ¼ in NW. ¼ SE. ¼ sec. 12, T. 1 S., R. 5 E.	1.00	Feb. 19, 1921
Millet, Wesley, et ux	Right of way in S. ½ NW. ¼ sec. 36, T. 1 S., R. 5 E	1.00	[1] June 17, 1920
Nowell, N. L., et al	Ditch and right of way through secs. 20 and 21, T. 1 S., R. 6 E.	1.00	[1] June 1, 1920
Paul, T. I., et al	Right of way and ditch in N. ½ SE. ¼ sec. 28, T. 3 N., R. 2 E.	1.00	[1] May 5, 1920
Pearce, Geo. W., et ux	Right of way in N. ½ sec. 30, T. 1 S., R. 6 E	1.00	Aug. 18, 1920
Pendergast, J. W., et al.	Ditch and right of way in S. ½, sec. 16, T. 2 N., R. 1 E	1.00	Dec. 8, 1920
Peterson, Henry L., et al	Right of way in NW. ¼ sec. 16, T. 2 S., R. 5 E	1.00	Nov. 6, 1920
Do	Ditch in sec. 16, T. 2 S., R. 5 E., in Maricopa County and right of way in NW. ¼ SW. ¼ sec. 16 and SW. ¼ NW. ¼ sec. 16, T. 2 S., R. 5 E.	1.00	[1] June 2, 1920
Scharbauer, Phil, et al	Right of way in N. ½ sec. 13, T. 1 N., R. 1 W	1.00	[1] Feb. 16, 1920
Smart, B. M., et al	Right of way in SW. ¼ sec. 33, T. 1 N., R. 3 E	1.00	Sept. 4, 1920
Stevens, D. A., et al	Right of way in N. ½ SW. ¼ sec. 1, T. 2 S., R. 5 E	1.00	Sept. 22, 1920
Thompson, Oliver C., et al.	Ditch in NW. ¼ SE. ¼ and right of way in N. ½ SW. ¼ and N. ½ SE. ¼ sec. 6, T. 1 N., R. 2 E.	1.00	[1] Apr. 10, 1920
Western Cattle Co	Right of way in SE. ¼ sec. 30, T. 3 N., R. 2 E	1.00	[1] June 15, 1920
Williams, John M., et al.	Ditch in N. ½ S. ½ and right of way in W. ½ SE. ¼ sec. 31, T. 2 N., R. 2 E.	1.00	[1] Apr. 8, 1920
Wilson, Mercer D., et ux.	Ditch and right of way in W. ½ NE. ¼ sec. 17, T. 1 S., R. 6 E.	1.00	Aug. 12, 1920
Winters, E. H., et ux	Right of way in W. ½ SW. ¼ SE. ¼ sec. 28, and NW. ¼ NW. ¼ NE. ¼ sec. 33, T. 1 N., R. 3 E.	1.00	Mar. 25, 1921

[1] These deeds not approved until fiscal year 1921.

Purchases of rights and property—Continued.

ARIZONA, YUMA PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Dickson, A. G., et ux..	Improvements on 3.79 acres in SE. ¼ NW. ¼ sec. 19, T. 9 S., R. 24 W., G. and S. R. B. and M.	$330.00	May 16, 1921
Escalanti, Dave.....	Improvements on 1.74 acres in SE. ¼ NW. ¼ sec. 22, T. 9 S., R. 24 W., G. and S. R. B. and M.	217.50	May 18, 1921
Flint, E. C., and Grothaus, L. C.	Improvements on 3.94 acres in SE. ¼ NE. ¼ sec. 23, T. 9 S., R. 24 W., G. and S. R. B. and M.	529.00	Dec. 1, 1920
Jones, Thora.....	Improvements on 2.14 acres in W. ½ SW. ¼ NW. ¼ sec. 24, T. 9 S., R. 24 W., G. and S. R. B. and M.	288.50	Dec. 7, 1920
Jones, W. J.....	Improvements on 6.42 acres in E. ½ SW. ¼ NW. ¼ sec. 24, T. 9 S., and SE. ¼ NW. ¼, sec. 24, T. 9 S., R 24 W., G. and S. R. B. and M.	472.00	Jan. 21, 1921
Lorden, Ida M.....	Improvements on 4.1 acres in W. ½ NE. ¼ sec. 23, T. 9 S., R. 24 W., G. and S. R. B. and M.	531.25	Jan. 26, 1921
Shields, A. M., et ux...	Improvements on 9.09 acres in E. ½ sec. 33, T. 9 S., R. 24 W., G. and S. R. B. and M.	1,136.25	Mar. 29, 1921

COLORADO, UNCOMPAHGRE PROJECT.

Black, Frank and Hattie	Montrose & Delta water right (0.65 second-foot).....	$400.00	Jan. 6, 1921
Deeble, John.....	0.08 acre in SW. ¼ NE. ¼ sec. 22, T. 49 N., R. 9 W., N. M. P. M.	1.00	Dec. 17, 1920
Faast, Ed.....	Loutsenhizer water right (0.25 second-foot).....	200.00	Mar. 19, 1921
Gray, Mrs. John.....	1.13 acres in SE. ¼ SW. ¼ sec. 22 and NE. ¼ NW. ¼ sec. 27, T. 49 N., R. 9 W., N. M. P. M.	174.50	Mar. 21, 1921
Lee, J. W., et al.....	0.89 acre in SE. ¼ NE. ¼ sec. 22, T. 49 N., R. 9 W., N. M. P. M.	125.00	Mar. 22, 1921
Luce, Emma A.....	Loutsenhizer water right (0.156 second-foot).....	125.00	Oct. 29, 1920
Maurer, E. H.....	0.37 acre in NW. ¼ NW. sec. 27, and SW. ¼ SW. ¼ sec. 22, T. 49 N., R. 9 W., N. M. P. M.	1.00	May 11, 1921
Meyer, Joseph H.....	Loutsenhizer water right (0.875 second-foot).....	700.00	Aug. 10, 1920
Moser, A. L. B.....	0.44 acre in lot 1, sec. 27, and SW. ¼ SW. ¼ sec. 22, T. 49 N., R. 9 W., N. M. P. M.	66.00	Apr. 13, 1921
Mowbray, Diana, et al..	5.04 acres in NE. ¼ NW. ¼ sec. 17, and 3.62 acres in lot 3, sec. 17, all in T. 48 N., R. 9 W., N. M. P. M.	1,500.00	July 14, 1920
Rollin, Fredcrick C., et al.	0.05 acre in NE. ¼ SW. ¼ and NW. ¼ SE. ¼ sec. 22, T. 49 N., R. 9 W., N. M. P. M.	1.00	Nov. 13, 1920
Sapinero Cattle Co.....	6.65 acres in SW. ¼ SW. ¼ and SE. ¼ SW. ¼ sec. 8, T. 48 N., R. 9 W., N. M. P. M.	250.00	July 15, 1920
Sittner, Oswald.....	Portion of Diehl Canal where it crosses block 1, of Merchant & Peabody subdivision of town of Montrose, Colo.	1.00	Nov. 16, 1920
Do.....	0.63 acre in lot 1, sec. 21, and 1.21 acres in lots 1 and 2, sec. 21, and lot 2, sec. 28, all in T. 49 N., R. 9 W., N. M. P. M.	550.00	Feb. 25, 1921
Virtue, Hannah, et al...	1.27 acres in NW. ¼ SE. ¼ sec. 22, T. 49 N., R. 9 W., N. M. P. M.	75.00	Mar. 31, 1921

IDAHO, BOISE PROJECT.

Appel, William H., and Lulu P. Appel.	A strip of land in NE. ¼ sec. 36, T. 21 S., R. 46 E., W. M., containing 2.33 acres.	$1.00	Aug. 18, 1920
Bacon, Almeda M.....	A strip of land in SE. ¼ sec. 12, T. 5 N., R. 6 W., B. M., containing 1.47 acres.	1.00	Mar. 18, 1920
Demo, John M., and Edna Demo and Elmer C. Cone and Nettie F. Cone.	A strip of land in SW. ¼ NW. ¼ sec. 36. T. 21 S., R. 46 E., W. M., containing 1.68 acres.	1.00	Oct. 12, 1920
Do.....	A strip of land in NW. ¼ sec. 36, T. 21 S., R. 46 E., W. M., containing 3.12 acres.	1.00	Nov. 23, 1920
Haley, J. A., and Alice C. Haley and C. R. Smeed, J. W. Smeed and Florence Smeed.	A strip of land in W. ½ SW. ¼ NE. ¼ sec. 26, T. 4 N., R. 3 W., containing 1.96 acres.	200.00	Oct. 30, 1918
Hurtt, Jay W., and Anna M. Hurtt.	A tract of land in N. ½ NE. ¼ sec. 19, T. 3 N., R. 3 W., containing 31.59 acres.	9,477.00	Feb. 19, 1921
Johns, Frank, and Agnes Johns.	A strip of land in the NE. ¼ SW. ¼ sec. 36, T. 21 S., R. 46 E., W. M., containing 3.76 acres.	1.00	Oct. 13, 1920
Lewison, Lewis A., and Caroline Lewison and John A. Lewison and Cora Von Keedick nd W. E. Keedick.	A strip of land in the NW. ¼ SW. ¼ sec. 36, T. 21 S., R. 46 E., W. M., containing 2.05 acres.	1.00	Sept. 30, 1920
Mu rray, J. H., and Mary E. Murray.	A strip of land in SW. ¼ NE. ¼ sec. 26, T. 4 N., R. 3 W., B. M., containing 1.74 acres.	200.00	Oct. 19, 1918

Purchases of rights and property—Continued.

IDAHO, BOISE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of contract.
Pollard, William H., and Vera Pollard.	A strip of land in lot 3, sec. 19, T. 5 N., R. 5 W., containing 3.21 acres.	[1] $140.00	Apr. 8, 1920
Welsh, Thos., and Anna E. Welsh and Wm. A. Coughanour and Galena Coughanour.	A strip of land in NW. ¼ SE. ¼ sec. 36, T. 21 S., R. 46 E., W. M., containing 0.71 acres.	1.00	Oct. 13, 1920

IDAHO, MINIDOKA PROJECT (AMERICAN FALLS DIVISION).

American Falls Natatorium Co.	NE. ¼ SW. ¼ and W. ½ SE. ¼ sec. 29, NW. ¼ NE. ¼ sec. 32, T. 7 S., R. 31 E., B. M., containing 160 acres.	$25,000.00	Nov. 6, 1920
Armstrong, J. M.	Lots 4 and 5, block 8, original town site	650.00	Dec. 22, 1920
American Falls Realty & Water Works Co. (Ltd.)	Lots 1 to 48 in block 18, lots 1, 2, 3, 28, 29, and 30, block 22; lots 1 to 15, block 23; lots 7 and 8, block 26, original town site.	3,250.00	Dec. 29, 1920
Bevan, Susan M.	Lots 1 to 3, inclusive, and lots 11 to 14, inclusive, and lots 35 and 36, block 24, original town site.	3,370.00	Jan. 22, 1921
Bosworth, Bertha A.	Lot 15, block 9, original town site	125.00	Jan. 20, 1921
Bradshaw, G.	Lots 21 and 22, block 34, Riverside addition	170.00	Feb. 15, 1921
Brandley, E. J.	Lots 9 and 10, block 25, original town site	180.00	Jan. 7, 1921
Breding, Hardy	Lots 8 and 9, block 26, Riverside addition	1,500.00	Mar. 10, 1921
Brooks, S. J.	Westerly 33 feet of lots 1 to 3, block 8, original town site.	900.00	Jan. 6, 1921
Brown & Moench	Lot 21, block 9, original town site	650.00	Dec. 24, 1920
Campbell, Lucy T.	Lots 44 to 46, block 21 and lots 1 to 5, block 42, original town site.	360.00	Jan. 3, 1921
Campbell, Lucy T.	Lots 6 to 21, block 42, original town site	480.00	Mar. 19, 1921
Collings, John	Lots 11, 12, and 13, block 19, Riverside addition	4,000.00	Mar. 9, 1921
Durkee, F. D.	Lots 4 to 7, block 20, original towm site	1,100.00	Dec. 24, 1920
Erickson, Carl A.	Lots 6 and 7, block 26, Riverside addition	250.00	Feb. 28, 1921
Erickson, Carl A.	W. ½ of lot 6 and lots 7 and 8, block 18, Riverside addition.	2,700.00	Mar. 10, 1921
Evans, L. L.	Lots 8 to 10, block 9, original town site	2,300.00	Dec. 30, 1920
Fackler, Ceta M.	Lots 10 and 11, block 64, Riverside addition	6,666.00	Mar. 4, 1921
Franklin, Mary C.	S. ½ NE. ¼ and all of SE. ¼ NW. ¼ lying S. and E. of O. S. L. R. R. right of way, sec. 29, T. 7 S., R. 31 E., and part of SW. ¼ NW. ¼ sec. 29, T. 7 S., R. 31 E., containing in all 127.62 acres.	12,762.00	May 19, 1920
First National Bank of American Falls, Idaho.	Lots 10, 12, and 13, block 9, Riverside addition	10,350.00	June 6, 1921
Gish, Maria	Lots 11 to 14, block 25, and lots 33 to 35, block 10, original town site.	4,410.00	Jan. 6, 1921
Hanson, George H.	Lots 14 to 16, block 6, and lot 16, block 9, original town site.	3,625.00	Jan. 5, 1921
Hays, Ollie Oliver	Lots 15 to 22, and 24 to 28, block 25, and lot 26, block 26, original town site.	865.00	Dec. 27, 1920
Hayward, Olive Swan	Lots 23 to 25, block 26, original town site	120.00	Apr. 25, 1921
Hooker, E. Earl	Lots 38 and 39, block 34, Riverside addition	120.00	Jan. 8, 1921
Imes, Eva	That part of the SW. ¼ SE. ¼ sec. 20, T. 7 S., R. 31 E., and NW. ¼ NE. ¼ and that portion of NE. ¼ NW. ¼ sec. 29, T. 7 S., R. 31 E., S. and E. of O. S. L. R. R. right of way, containing in all 87.90 acres.	8,790.00	May 19, 1920
Jones, Mrs. Bertha	Lots 29 and 30, block 34, Riverside addition	150.00	Jan. 29, 1921
Jones, R. O.	NE. ¼ NE. ¼ sec. 29, T. 7 S., R. 31 E	8,000.00	Feb. 16, 1921
Jordan, Sue R.	Lots 5 and 6, block 25, original town site	150.00	Dec. 31, 1920
Kay, Fred M.	Lots 27 and 28, block 34, lots 1 and 2, block 46, Riverside addition.	1,200.00	Apr. 25, 1921
Kiehn, Jacob	Lots 40, 41 and 42, block 40, Riverside addition	800.00	Mar. 4, 1921
Kohlhepp, Ella	Lots 29 and 30, blcok 10, original town site	940.00	Jan. 11, 1921
Lee, Julia A.	Lots 3 and 4, block 38, Riverside addition	60.00	Feb. 19, 1921
Leisy, A. H.	Lots 1 and 2, block 7, Union addition	2,200.00	Feb. 11, 1921
Leisy, A. H.	Lots 5 to 13, inclusive, block 35, Riverside addition	540.00	May 12, 1921
McCarty, Jane Olney	Lots 7 and 8, block 25, original townsite	260.00	Jan. 22, 1921
McKown, John L.	Lots 21 and 22, block 26, original town site	80.00	Jan. 31, 1921
Miller, Robert V.	Lots 11 to 14, block 27, Riverside addition	369.61	Jan. 11, 1921
Morris, Thomas O.	S. ½ sec. 11, T. 7 S., R. 31 E	3,200.00	Feb. 9, 1921
Mower, Lorenzo	Lots 7 to 10 and 39 to 41, block 24, original town site	375.00	Jan. 20, 1921
Mower, Wm. A.	Lots 4 to 6 and 37 and 38, block 24, original town site	275.00	Jan. 20, 1921
Naylor, M. D.	Lots 7 to 11, block 7, original town site	300.00	Mar. 12, 1921
Nelson, Peter	Lots 21 and 22, block 6; lots 6 to 9, block 8; lots 5 and 6, block 26; original town site.	3,160.00	Jan. 6, 1921
Nichols, Emily	Easterly 92 feet of lots 1, 2, and 3, block 8, original town site.	2,450.00	Dec. 27, 1920
Nye, Elmer D.	Lot 33 and W. ½ lot 34, block 13, Riverside addition	2,600.00	Mar. 3, 1921

[1] Bridge value.

Purchases of rights and property—Continued.

IDAHO, MINIDOKA PROJECT (AMERICAN FALLS DIVISION)—Continued.

Vendor.	Description.	Consideration.	Date of contract.
Oliver, Walter T	Lots 3, 23, and 24, block 6, and lots 1 and 2, block 7, original town site.	$622.50	Feb. 2, 1921
Oliver, Irene	Lot 23, block 25, original town site	171.00	Jan. 3, 1921
Philbrick, Wilma H	Lots 7 and 8, block 5; lots 7, 8, 19, and 20, block 6; lots 5 and 6, block 7; original town site.	900.00	Dec. 31, 1920
Pollard, O. W	Lots 18 and 19, block 16, Riverside addition	3,000.00	Feb. 23, 1921
Power County Abstract Co.	Lot 15, block 9, Riverside addition	1,800.00	Feb. 16, 1921
Rau, Fred	Lots 3, 4, and 5, block 23, Riverside addition	450.00	May 6, 1921
Sparks, Walter S	Lots 1 to 22, block 11, original town site	1,290.00	Mar. 7, 1921
Do	Lots 19 to 22, block 41, original town site	160.00	Mar. 26, 1921
Sparks, Thos. C	N. 60 feet of lots 1 to 4, inclusive, block 26, Riverside addition.	2,500.00	Feb. 9, 1921
Sprigg, Cloid G	Lots 11, 12, and 13, block 10, Riverside addition	3,400.00	Feb. 18, 1921
Stevens, Alfred D	Lots 23, 24, and 25, block 5, Riverside addition	2,500.00	Mar. 10, 1921
Stickle, Goddfrey	A portion of NE. ¼ SE. ¼, sec. 17, T. 7 S., R. 31 E., containing 18.55 acres.	350.00	Jan. 20, 1921
Swan, E. M	Lot 14, block 9, original town site	125.00	Jan. 20, 1921
Torrance, Kirby E	Lots 53 and 54, block 15, Riverside addition	2,300.00	Mar. 5, 1921
Trever, Frances E. Graff.	Lot 3, block 3, town site of American Falls, known as block 17 of original; lots 17 and 18, block 24, original town site.	2,500.00	Mar. 8, 1921
Thompson, C. W	Lots 1 and 2, block 21, Riverside addition	3,200.00	June 8, 1921
Tucker, R. L	E. ½ SE. ¼ sec. 29, T. 7 S., R. 31 E	6,000.00	June 16, 1920
Warf, Lee	Lots 10 to 19 and S. 19.5 feet of lots 9 and 20, block 3, original town site.	2,600.00	Dec. 28, 1920
West, Christina	Lots 9, 10, and 11, block 5; lots 5 and 6, block 6; lots 3 and 4, block 7; original town site.	1,620.00	Mar. 3, 1921
Wham, Paul J	Lots 1 to 4, inclusive, block 22, Riverside addition	1,100.00	Mar. 10, 1921
Willoughby, G. O	Lot 18, block 12, Riverside addition	180.00	Dec. 28, 1920
Wittwer, Ed and Gottlieb.	Lots 3 and 4, block 25, original town site	150.00	Jan. 20, 1921
Wones Mortgage Loan Corporation.	Lot 22, block 62, Riverside addition	17,000.00	Jan. 14, 1921

MONTANA, BLACKFEET (INDIAN) PROJECT.

Weaselhead and Josephine Weaselhead.	Purchase of lots 4 and 5, sec. 18, T. 30 N., R. 7 W., and lots 4 and 5, sec. 13, T. 30 N., R. 8 W., M. P. M.	$200.82	Jan. 12, 1921

MONTANA, FLATHEAD (INDIAN) PROJECT.

Gregg, Claude R	Purchase of 6.68 acres in SE. ¼ SW. ¼ sec. 34, T. 23 N., R. 24 W., M. P. M., and 24.4 acres in the NE. ¼ NW. ¼ sec. 3, T. 22 N., R. 24 W., M. P. M.	$1,250.00	Mar. 17, 1921
City of Polson, Mont	Payment for damage to street crossings broken by drag line excavator.	52.00	Nov. 12, 1920
Oxley, Allen S., and Martha J.	Flowage easement NW. ¼ NE. ¼ sec. 35, T. 22 N., R. 24 W., M. P. M.	150.00	Feb. 25, 1921

MONTANA, FORT PECK (INDIAN) RESERVATION.

Reiter, August F., and Mary.	Purchase of 0.57 acre in secs. 27 and 28, T. 31 N., R. 35 E., M. P. M.	$100.00	Jan. 29, 1921
Sheridan County, Mont.	Right of way for telephone line across public highways in secs. 21, 22, 23, 26, 27, and 28, T. 31 N., R. 55 E., M. P. M.	None.	Nov. 10, 1920

MONTANA, HUNTLEY PROJECT.

Nibbe, Ruth E	Purchase of Lateral N-10	$95.70	Nov. 29, 1920

Purchases of rights and property—Continued.

MONTANA, MILK RIVER PROJECT.

[Exclusive of St. Mary Storage Division.]

Vendor.	Description.	Consideration.	Date of contract.
Freeman, William W	Flowage easement, lots 3, 4, 6, and 7, SE. ¼ NE. ¼ sec. 18, T. 31 N., R. 26 E., M. M., 163.93 acres.	$1.00	Feb. 23, 1921
Hinsdale Mercantile Co.	Flowage easement, lot 8, sec. 33, T. 31 N., R. 36 E., M. P. M.	5.00	Nov. 5, 1920
Phillips County, Mont.	Perpetual right of way and easement for waterways across county highways.	None.	Oct. 6, 1920
Tanner, Charles	Purchase of lateral across secs. 33 and 34, T. 32 N., R. 35 E., M. P. M.	1,221.00	Nov. 26, 1920
Zehm, Fred W	Flowage easement, lots 3, 4, and 5, sec. 17, lots 5 and 8, sec. 18, T. 31 N., R. 26 E., M. P. M., 158.65 acres.	1.00	Feb. 23, 1921

MONTANA, ST. MARY STORAGE DIVISION.

Weaselhead, Peter	Purchase of 3 acres in sec. 15, T. 32 N., R. 11 W., M. P. M.	$135.00	Oct. 19, 1920

MONTANA, SUN RIVER PROJECT.

Beale, Harry O	Purchase of lateral	$371.70	Mar. 12, 1921
Beale, Samuel A	Flowage easement, NW. ¼ NW. ¼ sec. 17, NE. ¼ NW. ¼ sec. 18, T. 22 N., R. 7 W.	1.00	Jan. 27, 1921
Cascade County, Mont.	Right of way for telephone line along public highways, Sun River project.	None.	Mar. 15, 1921
Lewis and Clark County, Mont.	Perpetual right of way and easement for waterways across county highways.	None.	[1] Jan. 5, 1920

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

Stoll, J. E	Payment for material taken from 14.4 acres used as a barrow pit in the S. ½ NE. ¼ N. ½ SE. ¼ sec. 26, T. 22 N., R. 59 E.	$204.00	Oct. 28, 1920

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

Bristol, Martin, Mary B. Bristol, S. I. Shafer, Mattie K. Shafer.	To purchase 4.04 acres in SW. ¼ NE. ¼ sec. 27, T. 23 N., R. 56 W., 6th P. M., for storage yard.	$1,825.00	Mar. 30, 1921
Chicago, Burlington & Quincy R. R. Co.	Right to construct irrigation ditch across right of way of railroad company 30 feet E. from intersection of half section line, sec. 18, T. 23 N., R. 57 W., 6th P. M., with center line of present track of company.	500.00	July 14, 1920
Do	Right to construct transmission line on right of way of railroad at intersection of railroad right of way with line 30 feet W. of section line common to secs. 15-16, T. 23 N., R. 57 W., 6th P. M.	None.	Oct. 29, 1920
Do	Right to construct irrigation canal across right of way in NE. ¼ SW. ¼ sec. 28, T. 21 N., R. 50 W., 6th P. M.	6,060.00	Dec. 31, 1920
Farmers' Irrigation District and Chicago, Burlington & Quincy R. R. Co.	Right to construct irrigation ditch across right of way 30 feet E. of intersection of section line between secs. 15-16, T. 21 N., R. 53 W.	700.00	Nov. 30, 1920
Janssen, Peter, and Clara H. Janssen.	Perpetual right of way for drainage and irrigation well in E. ½ NW. ¼ sec. 34, T. 24 N., R. 57 W., 6th P. M.	1.00	Sept. 27, 1920
Katzer, Fred, and Jennie B. Katzer.	All right, title, and interest in Katzer irrigation ditch and system.	[2]	May 23, 1921
King, Elizabeth A., widow.	Perpetual right of way for drainage and irrigation well in N. ½ SE. ¼ sec. 28, T. 24 N., R. 57 W., 6th P. M.	1.00	Sept. 20, 1920
Middleton, John A., and Ida Middleton.	Perpetual right of way for drainage and irrigation well in SE. ¼ SE. ¼ sec. 28, T. 24 N., R. 57 W., 6th P. M.	1.00	July 22, 1920
Security Land Co	All right, title, and interest in Caldwell ditch, appurtenant to N. ½ SE. ¼ sec. 34, T. 23 N., R. 58 W., 6th P. M.	[3]	June 28, 1920
Do	All right, title, and interest in Marsh & Braziel ditch, appurtenant to S. ½ SW. ¼ and S. ½ SE. ¼ sec. 34, T. 23 N., R. 58 W., 6th P. M.	[4]	Do.

[1] Omitted from previous report.
[2] Construction of drainage ditch and delivery of water through Fort Laramie Division.
[3] 50 per cent of construction charge for Fort Laramie Division for area in said tract irrigable from Caldwell ditch.
[4] 66⅔ per cent of construction charge for Fort Laramie Division for area irrigable from M. & B. ditch.

Purchases of rights and property—Continued.

NEVADA, NEWLANDS PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Dalton, F. A. and Mamie M.	Donation of 2.93 acres for right of way "Dalton" lateral.	$1.00	Mar. 4, 1921
Depp, T. H., and C. H. Asbury.	.....do.....	1.00	Mar. 5, 1921
Humphrey Supply Co..	Change in location of right of way.....	None.	[1] Feb. 25, 1920
McGoldrick, James and Maria.	Purchase of improvements on right of way.....	75.00	June 13, 1921
Yarbrough, Robert and Rebecca.	Allocation of lands covered by vested water rights....	None.	Sept. 8, 1920

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

Bartlett, A. E.....	Purchase of 1.77 acres in SW. ¼ NW. ¼ NW. ¼ SW. ¼ sec. 26 and SE. ¼ NE. ¼ sec. 35, T. 31 S., R. 6 E., El Paso County, Tex.	$236.25	May 6, 1920
Bradford, J. A.....	Improvements on stock-subscribed land, 4.64 acres in S. ½ NW. ¼ sec. 25, T. 31 S., R. 6 E., El Paso County, Tex.	324.80	Mar. 5, 1921
Brazell, Margaret G.....	Improvements on stock-subscribed land, 0.21 acre in NE. ¼ SW. ¼ sec. 15, T. 31 S., R. 6 E., El Paso County, Tex.	42.00	Do.
Buckler, Margaret.....	Improvements on stock-subscribed land, 3.85 acres in W. ½ sec. 31, T. 31 S., R. 7 E., El Paso County, Tex.	385.00	Mar. 2, 1921
Burrus, Jos., et ux.....	Purchase of 1.26 acres in SW. ¼ NW. ¼ and N. ½ SW. ¼ sec. 36, T. 31 S., R. 6 E., El Paso County, Tex.	141.00	Aug. 16, 1920
Bustamente, Ruperto, et al.	Donation of 0.01 acre in NE. ¼ SE. ¼ sec. 9, T. 19 S., R. 3 W., Dona Ana County, N. Mex.	1.00	June 14, 1920
Candelaria, Elijio, et al..	Purchase of improvements on stock-subscribed land, 1.11 acres in SE. ¼ SW. ¼ sec. 26, T. 31 S., R. 6 E., El Paso County, Tex.	259.00	Dec. 7, 1920
Clapp, Lafayette.....	Purchase of 1.47 acres in SE. ¼ NE. ¼ sec. 8 and SW. ¼ NW. ¼ sec. 9, T. 19 S., R. 3 W., Dona Ana County, N. Mex.	147.00	June 15, 1920
Coffin, C. O.....	Donation of 0.03 acre in SW. ¼ sec. 16, T. 32 S., R. 7 E., El Paso County, Tex.	1.00	May 12, 1920
Curry, Della.....	Purchase of 1.19 acres in SW. ¼ NW. ¼ sec. 26, T. 31 S., R. 6 E., El Paso County, Tex.	193.97	Aug. 10, 1920
El Paso County	Donation of 6.84 acres in W. ½ SW. ¼ sec. 9 and NE. ¼ SE. ¼ and SE. ¼ NE. ¼ sec. 8, T. 32 S., R. 7 E., El Paso County, Tex.	1.00	Apr. 23, 1918
Fink, Wm. N	Donation of 2.36 acres in SW. ¼ SW. ¼ sec. 30 and NW. ¼ NW. ¼ sec. 31, T. 33 S., R. 8 E., El Paso County, Tex.	1.00	Dec. 23, 1918
Gaal, I. G.....	Purchase of 3.19 acres in N. ½ NE. ¼ sec. 35, T. 31 S., R. 6 E., El Paso County, Tex.	1,143.25	Mar. 7, 1921
Guerra, Andreas.....	Purchase of 0.54 acre in NE. ¼ NW. ¼ sec. 8, T. 19 S., R. 3 W., El Paso County, Tex.	40.50	May 14, 1920
Guerra, P. L.	Purchase of 1.41 acres in SW. ¼ SE. ¼ sec. 15, T. 31 S., R. 6 E., El Paso County, Tex.	601.80	June 21, 1920
Hunsaker, J. N.....	Donation of 0.43 acre in NE. ¼ SW. ¼ sec. 21, T. 32 S., R. 7 E., El Paso County, Tex.	1.00	Aug. 28, 1920
Kerby, M. M.....	Donation of 8.75 acres in NW. ¼ sec. 35 and SW. ¼ sec. 26, T. 28 S., R. 3 E., El Paso County, Tex.	1.00	Aug. 4, 1917
Knox, J. F.....	Purchase of 2.22 acres in NW. ¼ NW. ¼ sec. 25 and NE. ¼ NE. ¼ sec. 26, T. 31 S., R. 6 E., El Paso County, Tex.	501.00	Aug. 2, 1920
Lopez, Luciano.....	Donation of 2.1 acres in W. ½ and SE. ¼ SW. ¼ sec. 8, T. 34 S., R. 8 E., El Paso County, Tex.	1.00	Feb. 21, 1920
Luce, H. A.....	Donation of 0.71 acre in SW. ¼ NW. ¼ sec. 25, T. 31 S., R. 6 E., El Paso County, Tex.	1.00	Apr. 30, 1920
McCarty, Jos. C.....	Purchase of improvements (special contract) on 2.19 acres in S. ½ and NW. ¼ SW. ¼ sec. 2, T. 23 S., 1 E., Dona Ana County, N. Mex.	320.00	Aug. 24, 1920
Maese, Concepcion, et ux.	Purchase of 0.54 acre in SE. ¼ NE. ¼ sec. 15 and W. ½ NW. ¼ sec. 14, T. 23 S., R. 1 E., Dona Ana County, N. Mex.	81.00	July 29, 1920
Perea, Bruno.....	Donation of 0.12 acre in SE. ¼ NE. ¼ sec. 8, T. 19 S., R. 3 W., Dona Ana County, N. Mex.	1.00	Aug. 28, 1920
Refugio, Lujan Apodaca.	Purchase of improvements on stock-subscribed land, 0.31 acre in E. ½ SE. ¼ sec. 7, T. 32 S., R. 7 E., El Paso County, Tex.	20.00	Apr. 12, 1921
Do.....	Purchase of improvements on stock-subscribed land, 2 tracts, 0.44 acre in N. ½ and SE. ¼ SW. ¼ and 0.11 acre in SE. ¼ SW. ¼, all sec. 18, T. 32 S., R. 7 E., El Paso County, Tex.	55.00	Apr. 15, 1921

[1] Approved Sept. 7, 1920.

Purchases of rights and property—Continued.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of contract.
Russell, James Webb, et ux.	Purchase of 1.33 acres in SW. ¼ NW. ¼ sec. 26, T. 31 S., R. 6 E., El Paso County, Tex.	$220.49	July 29, 1920
Santa Fe Ry. Co.	Donation of 11.72 acres in NW. ¼ sec. 29, SW. ¼ sec. 20, SE. ¼ and NE. ¼ sec. 19, SE. ¼ and SW. ¼ sec. 18, all T. 25 S., R. 3 E., Dona Ana County, N. Mex.	1.00	June 7, 1918
Trujillo, Juan Jose, et ux.	Purchase of 1.62 acres in NW. ¼ NE. ¼ and S. ½ NE. ¼ sec. 8, T. 19 S., R. 3 W., El Paso County, Tex.	64.80	May 14, 1920
Wade, E. C., et al	Purchase of 2.97 acres in E. ½ SW. ¼ sec. 11, T. 19 S., R. 3 W., Dona Ana County, N. Mex.	222.75	Feb. 17, 1921
Wahl (Mrs.), G. H., et al.	Purchase of 1.15 acres in SW. ¼ SE. ¼ and SE. ¼ SW. ¼ sec. 26, T. 31 S., R. 6 E., El Paso County, Tex.	218.50	July 6, 1920
Webb, M. H., et ux	Improvements on stock-subscribed land, 0.83 acre in NW. ¼ NW. ¼ sec. 30, T. 33 S., R. 8 E., El Paso County, Tex.	100.00	Dec. 7, 1920
White, Owen P., and Alward H.	Donation of 3.57 acres in NW. ¼ SW. ¼ sec. 6, T. 32 S., R. 7 E., and NE. ¼ SE. ¼ and SE. ¼ NE. ¼ sec. 1, T. 32 S., R. 6 E., El Paso County, Tex.	1.00	July 18, 1919
Do	Improvements on above-described land	498.00	Do.
Wilmarth, J. C	Donation of 1.5 acres in W. ½ NE. ¼ sec. 7, T. 34 S., R. 8 E., El Paso County, Tex.	1.00	Feb. 4, 1920

COMMUNITY DITCH SYSTEMS.

Clark lateral	4 quitclaim deeds executed by owners holding lands taking water from this ditch, situate in Dona Ana County, N. Mex.	$1.00	June 9, 1920 June 16, 1920 July 12, 1920 Do.

OREGON, UMATILLA PROJECT.

R. S. Howard, jr., receiver of the Title Guarantee & Trust Co., of Multnomah County, Oreg.	Lots 1, 2, 3, 4, 5, and 6, block 41, town site of Irrigon, Morrow County, Oreg.	$190.00	Oct. 2, 1919

OREGON-CALIFORNIA, KLAMATH PROJECT.

Bloomingcamp, Edward and George.	Part NW. ¼ NE. ¼ and NE. ¼ SW. ¼ sec. 30, T. 39 S., R. 10 E., W. M.	$460.00	Sept. 13, 1920
Do	Part SE. ¼ sec. 30 and of lot 1, T. 39 S., R. 10 E., W. M.	2,120.00	Sept. 13, 1920
Bloomingcamp, George.	Part E. ½ NW. ¼ and SE. ¼ NW. ¼ sec. 30, T. 39 S., R. 10 E., W. M.	640.00	Sept. 13, 1920
Griffith, John C., et ux.	Part lot 11, sec. 31, T. 39 S., R. 10 E., W. M. (improvements).	100.00	Dec. 24, 1920
Obenchain, Silas, et al.	Part W. ½ SE. ¼ sec. 19, T. 39 S., R. 10 E., W. M.	260.00	Sept. 13, 1920
West, M. S., et ux	Part SW. ¼ NE. ¼ sec. 19, T. 39 S., R. 10 E., W. M.	90.00	Oct. 9, 1920
Zlabek, Ferdinand, et ux.	Donation deed to part SE. ¼ SW. ¼ and SW. ¼ SE. ¼ sec. 35, T. 40 S., R. 10 E., W. M.	1.00	Mar. 31, 1921

UTAH, STRAWBERRY VALLEY PROJECT.

Diamond, Theodore E.	Right of way across SE. ¼ NE. ¼ sec. 11, T. 8 S., R. 3 E., S. L. B. and M., Mapleton Lateral, area 0.26 acres; fee title.	$35.00	May 21, 1921
Enberg, A. G., et ux	Right of way across N. ½ SE. ¼ and SE. ¼ NE. ¼ sec. 27, T. 8 S., R. 3 E., S. L. B. and M., Mapleton Lateral, area 3.36 acres; improvements only.	10.00	Mar. 19, 1918
Jensen, Joseph, et ux	Right of way across SW. ¼ SE. ¼ sec. 2, T. 8 S., R. 3 E., S. L. B. and M., Mapleton Lateral, area 1.28 acres; fee title.	25.00	Feb. 10, 1921

Purchases of rights and property—Continued.

WASHINGTON, OKANOGAN PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Allen, T. J., et ux	SE. ¼ NW. ¼ sec. 19, T. 34 N., R. 27 E., W. M. (water-right equity).	$900.00	Feb. 14, 1921
Boozer, Effie L	E. ½ E. ½ NW. SW. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	500.00	June 12, 1919
Colquhoun, W. H	NE. ¼ SE. ¼ NE. ¼ and W. ½ SE. ¼ NE. ¼ sec. 25, T. 34 N., R. 26 E., W. M. (water-right equity).	600.00	Feb. 10, 1921
Cope, William A., et ux	Lots 11, 13, and 14, block "S," Conconully Mining Co.'s first addition to town of Conconully, Wash., in sec. 6, T. 35 N., R. 25 E., W. M.	50.00	May 11, 1919
Dickey, W. M., et ux	SW. ¼ NE. ¼ NE. ¼ sec. 25, T. 34 N., R. 26 E., W. M. (water-right equity).	400.00	June 17, 1919
Dodge, Rodney C	NW. ¼ SW. ¼ SE. ¼ sec. 18, T. 34 N., R. 27 E., W. M. (water-right equity).	200.00	June 14, 1919
Do	NW. ¼ SE. ¼ SW. ¼ sec. 18, T. 34 N., R. 27 E., W. M. (water-right equity).	500.00	July 19, 1920
Do	SW. ¼ SE. ¼ sec. 18, T. 34 N., R. 27 E., W. M. (water-right equity).	300.00	June 14, 1919
East, John, et ux	NE. ¼ NW. ¼ sec. 10, T. 34 N., R. 26 E., W. M	300.00	Dec. 15, 1919
Elmore, Geo. A., et ux	Lot 12 in block "S," Conconully Mining Co.'s first addition to town of Conconully, Wash., in sec. 6, T. 35 N., R. 25 E., W. M.	30.00	Sept. 11, 1919
Ferguson, Josephine B	E. ½ NW. ¼ SE. ¼ sec. 19, T. 34 N., R. 27 E., W. M. (water-right equity).	400.00	May 26, 1919
First National Bank	N. ½ NW. ¼ SW. ¼ NW. ¼ sec. 26, T. 34 N., R. 26 E., W. M. (water-right equity).	100.00	Dec. 1, 1919
Do	NE. ¼ SW. ¼ NW. ¼ sec. 26, T. 34 N., R. 26 E.. W. M. (water-right equity).	200.00	Do.
Francis, Joseph H	Lots 14 and 15, block "R," Conconully Mining Co.'s first addition to town of Conconully, Wash., sec. 6, T. 35 N., R. 25 E., W. M.	150.00	July 12, 1919
Funston, Mary H	SE. ¼ SE. ¼ SW. ¼ sec. 18, T. 34 N., R. 27 E., W. M. (water-right equity).	400.00	June 2, 1920
George, Willard H., et ux.	SE. ¼ NE. ¼ sec. 19, T. 34 N., R. 27 E., W. M. (water-right equity).	1,330.00	Feb. 2, 1921
Godfrey, John, et ux., and William P. Barlett, et ux.	Lot 1 and part lot 2, sec. 36, T. 34 N., R. 26 E., W. M	575.00	July 17, 1919
Heland, John B	NW. ¼ NW. ¼ NE. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	500.00	July 28, 1919
Hemminger, Gertrude	SW. ¼ NE. ¼ sec. 7, T. 34 N., R. 27 E., W. M. (water-right equity).	800.00	Aug. 22, 1919
Hibbard, Webster H., et ux.	NW. ¼ NE. ¼ sec. 18, T. 34 N., R. 27 E., W. M. (water-right equity).	910.00	June 21, 1919
Hole, Harry M., et ux	NW. ¼ NE. ¼ SE. ¼ sec. 18, T. 35 N., R. 26 E., W. M. (water-right equity).	500.00	May 5, 1919
Justice, Henrietta I	S. ½ SW. ¼ SE. ¼ sec. 19, T. 34 N., R. 27 E., W. M. (water-right equity).	500.00	Sept. 29, 1920
Kane, Maude C., et wir	W. ½ NE. ¼ SW. ¼ sec. 18, T. 34 N., R. 27 E., W. M	1,000.00	June 10, 1919
Kerr, Harry J	NW. ¼ NE. ¼ sec. 18, T. 34 N., R. 27 E., W. M. (water-right equity).	650.00	June 21, 1919
Klessig, Leo M., et ux	NE. ¼ SE. ¼ SE. ¼ sec. 24, T. 34 N., R. 26 E., W. M. (water-right equity).	470.00	Feb. 17, 1920
Lane, C. W., et ux	S. ½ NW. ¼ SW. ¼ SE. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	140.00	Aug. 7, 1920
Do	N. ½ NW. ¼ SW. ¼ SE. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	140.00	Dec. 27, 1920
Lang, Carl	N. ½ NW. ¼ NW. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	450.00	July 31, 1919
Lovely, Frank	S. ½ NW. ¼ SW. ¼ NW. ¼ sec. 26, T. 34 N., R. 26 E., W. M. (water-right equity).	100.00	June 8, 1920
Maples, Jesse, et wir	Lots 3, 4, 5, 6, 7, 8, 9, 10, 16, 17, and 18 in block "R," Conconully Mining Co.'s first addition to town of Conconully, Wash., in sec. 6, T. 35 N., R. 25 E., W. M.	230.00	Sept. 11, 1919
Mitchell, Paul A., et ux.	N. ½ NE. ¼ NW. ¼ sec. 25, T. 34 N., R. 26 E., W. M. (water-right equity).	400.00	Aug. 27, 1919
Omak Improvement Co.	SW. ¼ SE. ¼ sec. 24, T. 34 N., R. 26 E., W. M. (water-right equity).	800.00	Oct. 25, 1920
Pinkston, Philip H., et ux.	Two tracts of land in sec. 6, T. 35 N., R. 25 E., W. M., described by metes and bounds and containing 0.32 acre and 1.81 acres, respectively.	500.00	Mar. 20, 1920
Reed, T. C., et ux	NE. ¼ NE. ¼ SW. ¼ and E. ½ SE. ¼ NE. ¼ SW. ¼ sec. 19, T. 34 N., R. 27 E., W. M. (water-right equity).	300.00	Dec. 1, 1920
Salisbury, Guy M., et ux.	S. ½ NW. ¼ NW. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	1,000.00	June 10, 1919
Segrist, Zola Ruse, et wir.	E. ½ SE. ¼ SE. ¼ SE. ¼ sec. 25, T. 34 N., R. 26 E., W. M. (water-right equity).	250.00	May 24, 1919
Shumway, Maude L., et wir.	E. ½ NE. ¼ SE. ¼ sec. 25, T. 34 N., R. 26 E., W. M. (water-right equity).	400.00	July 8, 1920

Purchases of rights and property—Continued.

WASHINGTON, OKANOGAN PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of contract.
Stubenrauch, John, et ux.	N. ½ NW. ¼ NE. ¼ sec. 19, T. 34 N., R. 27 E., W. M. (water-right equity).	$530.00	June 20, 1919
Thorne, C. C., et ux.	SW. ¼ SW. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	900.00	June 13, 1919
Troost, Mary A.	SW. ¼ NW. ¼ SW. ¼ sec. 20, T. 34 N., R. 27 E., W. M. (water-right equity).	500.00	June 1, 1918
Watkins, Clarence E., et ux.	NE. ¼ NE. ¼ NW. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	500.00	Dec. 17, 1919
Watkins, Wm. T., et ux.	E. ½ NW. ¼ NE. ¼ NW. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	250.00	Dec. 10, 1919
Wenner, Frank W., et ux.	W. ½ NW. ¼ NE. ¼ NW. ¼ sec. 30, T. 34 N., R. 27 E., W. M. (water-right equity).	250.00	Do.
Wilshire, W. W.	W. ½ NE. ¼ SW. ¼ and S. ¼ acres W. ½ SE. ¼ NE. ¼ SW. ¼ sec. 19, T. 34 N., R. 27 E., W. M. (water-right equity).	650.00	Nov. 31, 1920
Yule, Ernest W., et ux.	SW. ¼ NW. ¼ sec. 19, T. 34 N., R. 27 E., W. M. (water-right equity).	860.00	June 14, 1919

WYOMING, SHOSHONE PROJECT.

Brum, Mike	Payment for damage to growing crops due to break in drain L, farm unit "N" or tract 2 of lot 57, T. 55 N., R. 99 W., 6th P. M., Wyoming.	$100.08	Feb. 4, 1921
State Highway Commission, Wyoming.	Perpetual right of way and easement for construction waterways over and across State highways.	None.	Feb. 8, 1921
Stone, J. D.	Payment for damage to growing crops due to break in Deaver pipe line, farm unit "F," sec. 30, T. 57 N., R. 97 W., 6th P. M., Wyoming.	202.50	July 29, 1920
Watson, Minnie N.	Payment for damage to growing crops due to break in closed drain L, farm unit "C," lot 51, T. 55 N., R. 99 W., 6th P. M., Wyoming.	100.00	July 8, 1920

PRINCIPAL CURRENT CONTRACTS.

In the following tables are shown, by projects, data relative to the principal contracts in operation or completed during the fiscal year ending June 30, 1921:

Principal current contracts.

ARIZONA-CALIFORNIA, YUMA PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
445	1916. Dec. 23	Continental Securities Co.	Supplying water for irrigation purposes.	.....	.....	(1)
551	1919. May 6	Yuma Mesa Irrigation Co.	Water for irrigation.....	.....	.....	(2)
4-24	1920. May 1	Yuma Light, Gas & Water Co.	Water supply to headquarters and quarry.	$3,000.00	.....	1922. June 30
Den. Ad. 22070	July 8	Pacific-American Petroleum Co.	Gasoline and distillate.....	12,675.00	.....	1921. June 30
Den. Ad. 22070	...do.....	Standard Oil Co.....	Lubricating oils and greases..	2,227.00	.....	Do.
	July 10	Trustees of town site of Gadsden.	Domestic and municipal water supply.	.....	.....	1923. Dec. 31
	Aug. 1	Mountain States Telephone & Telegraph Co.	Telephone service.....	600.00	.....	June 30
837	Aug. 13	Pawling & Harnischfeger.	Drag-line excavator.....	10,630.00	.....	1921. Feb. 17
4-29	July 8	Laura A. Elder.....	Rock from quarry for revetment.	1,950.00	.....	June 30
4-30	July 1	State of Arizona.....	Surveys and investigation Gila Valley at San Carlos, Ariz.	5,000.00	.....	
	Aug. 1	Yuma Light, Gas & Water Co.	Electric current for power and lighting.	3,000.00	.....	1922. June 30
4-32	Aug. 28	Imperial Irrigation District.	Investigation of irrigation development possibilities of Imperial Valley.	40,000.00	.....	
Den. Ad. 23448	Oct. 21	Tarr & McComb (Inc.).	Fuel oil.....	8,130.00	.....	1921. June 30
4-40	Dec. 14	Coachella Valley County Water District.	Examination and survey for storage reservoir, Boulder Canyon.	5,000.00	.....	
4-32	1921. Jan. 27	Imperial Irrigation District.	Supplemental to contract of Aug. 28, 1920.	30,000.00	.....	
4-48	May 24	Morris H. Biggs.....	Construction of ditch riders' houses.	1,237 50	.....	

MESA DIVISION.

827	1920. July 12	General Electric Co..	Electrical apparatus, B Lift pumping plant.	$25,000.00	.....	1921. June 15
829	June 29	Whiting Foundry Equipment Co.	Traveling crane, B Lift pumping plant.	1,980.00	.....	(3)
830	June 23	Heulings Lippincott and Alfred J. Major, receivers for Camden Iron Works.	Motor-operated gate valve, B Lift pumping plant.	2,098.00	.....	Feb. 28

[1] Upon completion of United States plant to irrigate same area.
[2] Upon completion of Government plant.
[3] Completed.

Principal current contracts—Continued.

ARIZONA-CALIFORNIA, YUMA PROJECT—Continued.

MESA DIVISION—continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1920.					1921.
831	July 2	Worthington Pump & Machinery Corporation.	Centrifugal pump and spare parts, B Lift pumping plant.	$7,825.00	.....	Mar. 25
832	Aug. 7	George Co.....	Earthwork, Part One, schedules 1, 2, and 3.	25,671.00	.....	(3)
835	Aug. 14	Bucyrus Co.....	Drag-line excavator.....	18,850.00	.....	Feb. 4
Den. Ad. 23758	Nov. 19	California Portland Cement Co.	Cement.....	3,550.00	.....	June 30
Den. Ad. 24188	Dec. 29	Western Pipe & Steel Co.	Plate steel manifold, B Lift pumping plant.	2,225.00	.....	Mar. 1
	1921.					
4-35	Jan. 28	John H. Willis.....	Drilling well.....	646.00	.....	(3)

IDAHO, BOISE PROJECT.

	1920.					1921.
839	Sept. 28	F. A. Gould.....	Earthwork, Notus Canal.....	$38,740.00	$59,633.00	Apr. 16
840	Sept. 27	Gus Carlson & Co...	.....do.....	51,820.00	63,420.00	Apr. 1
	Nov. 23	Relyea & Walker....	Earthwork, Notus Canal laterals.	2,669.00	3,971.00	Apr. 15

IDAHO, KING HILL PROJECT.

	1920.					1921.
	July 8	L. J. Morrison.....	Lease of stable.....	$72.00	$23.50	July 15
						1920.
	July 19	Pacific Portland Cement Co.	Cement.....	21,275.00	19,250.00	Dec. 31
						1921.
	July 20	Elmore Development Co.	Lease of buildings.....	96.00	88.00	Aug. 1
						1920.
	Aug. 2	Omar Fricke.....	Ice.....	300.00	218.00	Dec. 31
	Aug. 5	John Anderson.....	Stock hire.....	720.00	574.00	Do.
	Sept. 1	Vulcan Iron Works Co.	Gates and hoists.....	2,594.00	2,594.00	Dec. 15
						1921.
	Sept. 4	B. Griffin.....	Hauling.....	4,417.00	5,674.00	Mar. 1
	...do.....	.....do.....	.....do.....	1,600.00	730.00	Jan. 1
						1920.
	Sept. 9	Mpls. Steel & Machinery Co.	Repairs to bridge.....	2,000.00	2,000.00	Dec. 15
						1921.
	Sept. 16	Joe Wells.....	Lease of gravel pit.....	50.00	50.00	Mar. 31
	Sept. 29	Oregon Short Line R. R.	Lease of land.....	25.00	25.00	Sept. 1
	Oct. 15	Bryant Tire & Vulcanizing Co.	Truck tires.....	529.00	106.00	Jan. 1
	Oct. 19	Frank A. Lisle.....	Lease of land.....	50.00	50.00	Apr. 18
	Oct. 22	Griffin & Moody....	Hauling.....	1,295.00	1,126.00	Mar. 1
	Oct. 30	.....do.....	Excavation.....	3,637.00	2,894.00	Jan. 22
	Nov. 6	Harry B. Bergstrom.	Lease of land.....	75.00	75.00	May 6
	Dec. 27	Henry Hafer.....	.....do.....	1.00	1.00	Apr. 15
	Dec. 28	J. L. Jolley.....	Hay.....	180.00	267.00	June 30
	1921.					1923.
	Jan. 3	Idaho Power Co.....	Electric current.....	900.00	150.00	Dec. 31
	Feb. 1	.....do.....	.....do.....	250.00	25.00	Do.
						1922.
	Feb. 3	Cora M. Wood.....	Lease of buildings.....	120.00	60.00	Feb. 3
						1921.
	Mar. 31	Pawling & Harnischfeger Co.	Drag line.....	11,425.00	11,425.00	June 30
	Apr. 23	King Hill Irrigation District.	Operation and maintenance..	.....	.....	.....

[3] Completed.

Principal current contracts—Continued.

IDAHO, KING HILL PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1921.					1921.
	Apr. 29	State of Idaho	Reimbursement for excavation.	$2,000.00	.....	.....
	May 17	Mrs. J. R. Wagner	Meals	500.00	$271.00	Dec. 1
	May 18	Omar Fricke	Ice	587.00	15.00	Do.
						1922.
	June 1	Mountain States Telephone & Telegraph Co.	Services	300.00	10.00	June 1

MONTANA, MILK RIVER PROJECT.

(Exclusive of St. Mary Storage Division.)

	1920.					1920.
27	June 29	C. R. Buffington	Laterals NS 9-50 and 9-50-3	$697.50	$713.17	Aug. 13
						1921.
28	Sept. 22	E. E. Woodard	Laterals NS 116-2-10	2,860.00	2,094.40	May 31
29	Sept. 20	Paul Paulsen	....do	2,100.00	2,037.00	Do.
30	Oct. 4	John L. Willer	Waste-water ditchès and extension V W-8.	286.80	262.18	Nov. 30
31	Oct. 7	Harvey Booth	V-85, V-108	4,395.80	3,929.12	May 15
35	Oct. 8	C. R. Buffington	NS-141	4,320.00	4,759.75	Do.
36	Oct. 26	J. H. Jordan	NR waste-water ditches	735.00	376.25	Do.
38	Nov. 17	C. R. Buffington	NR Canal laterals	2,646.00	2,388.99	May 31
39	Oct. 29	John L. Willer	V-235-3	1,306.80	1,424.62	May 15
						1920.
40	Nov. 5	Ereaux & Tolman	Lateral DS-50	320.00	310.00	Dec. 31
41	...do	C. N. Wygal	Waste-water ditches W-5-1, W-5-2, W-5-4.	400.00	362.32	Do.
						1921.
42	Nov. 12	E. P. Brunzell	Saco headquarters building	1,017.90	1,066.48	Feb. 1
43	Dec. 3	R. H. Beam	Cottage at Vandalia Dam	875.00	1,069.46	Mar. 1
	1921.					
46	Jan. 8	Orville E. Mapes	Lodging house at Saco	2,021.00	2,079.84	Apr. 30
48	Apr. 6	C. R. Buffington	NR Canal	1,294.00	751.40	June 30
49	Apr. 4	J. S. Statelar	....do	780.00	698.90	May 15
50	Apr. 29	Rutherford & Brown	....do	2,565.00	1,556.67	June 30
51	Apr. 22	Charles H. Weston	V Canal laterals, NR Canal laterals.	2,919.15	1,399.10	(4)
52	May 26	Smith & Marts	NR Canal laterals NN-O	253.00	364.15	June 15
53	June 1	Andrews-Henderson; Majarrison-Pankake.	DN Canal lateral DN-46	160.00	150.20	June 10
54	June 15	Hall & Booth	V Canal laterals and waste-water ditches.	5,025.00	None.	Sept. 30
55	June 22	Rutherford & Brown	Bowdoin Canal lateral B-48	1,475.00	None.	Aug. 31
56	June 21	Victor Dostert	Structures NR Canal laterals	3,151.00	None.	Oct. 31
						1922.
859	June 3	White, Brown & Leahy.	NR Enlargement	97,145.00	3,201.60	Dec. 31

ST. MARY STORAGE DIVISION.

	1920.					
828	June 18	Bucyrus Co. South Milwaukee, Wis.	Drag line	$18,190.00	.....	(5)

[4] Schedule 1, May 20, 1921; schedules 2 and 3, Sept. 30, 1921. [5] Received October, 1920

Principal current contracts—Continued.

MONTANA, SUN RIVER PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1921. Mar. 5	David Svenby	Earthwork, laterals, Greenfields Division.	$594.75	$716.55	1921. [3] May 19
	...do	Henry & John Bremer.	...do	219.75	182.40	Do.[3]
854	May 28	J. B. Roberts & Son.	Earthwork and structures, Beale Division schedules 1, 2, and 3.	5,764.00	1,550.88	Sept. 9
855	...do	Wittke & Beck	Earthwork and structures, Beale Division, schedule 4.	2,554.00	510.17	Do.
861	May 23	Threet Bros	Earthwork and structures, Beale Division, schedule 5.	1,598.70	.....	Aug. 31

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

	1919. May 10	City of Torrington, Wyo.	Sale of electrical energy	$9,600.00	$11,648.77	1921. May 10
	Sept. 1	Lincoln Land Co.	Lease of camp site	60.00	60.00	1920. Sept. 1
	Sept. 15	J. S. Mainard	Rental of storehouse	300.00	250.00	Sept. 15
	Oct. 27	Town of Lingle, Wyo.	Sale of electrical energy	720.00	914.37	1921. Oct. 27
	1920. Apr. 15	City of Mitchell, Nebr.	...do	5,400.00	8,838.05	1922. Apr. 27
	...do	Village of Morrill, Nebr.	...do	2,700.00	4,035.92	Do.
	Apr. 16	The White Motor Truck Co.	Freighting to Pathfinder Dam.	12,000.00	14,909.56	1921. Apr. 16
	.....	Gering and Fort Laramie Irrigation District.	Construction	5,250,000.00	.....	
	May 15	Kelly Well Co.	Drilling and casing drainage wells.	4,275.00	4,671.00	1920. [6] Aug. 1
	June 1	Northport Irrigation District.	Water for irrigation	400.00	400.00	Sept. 15
	June 15	Farmers' Irrigation District and Minatare Drainage District.	Construction of drainage ditch.	33,330.00	.....	
	...do	Bridgeport Electric Light & Power Co.	Purchase of power	[7] 300.00	.....	([8])
	July 6	Farmers' Irrigation District.	Unification of Lower Nine Mile drainage system.	3,563.27	3,563.27	
	...do	...do	Cooperative participation in cost and operation and maintenance of Leavitt Drain.	2,941.93	2,941.93	
22238	July 16	Denver Engineering Works.	Structural steel	1,000.00	.....	
825	July 15	Pawling & Harnischfeger.	208 drag lines	17,450.00	8,725.00	
826	July 20	Austin Machinery Corp.	No. 4 drag line	8,225.00	.....	
	July 31	Geo. S. Smith	Grazing lease	8.67	8.67	Dec. 31
	...do	J. S. McClurg	...do	10.00	10.00	Do.
	...do	O. W. Long	...do	21.75	21.75	Do.
22411	Aug. 2	Westinghouse Electric Co.	6 75-kva. transformers	4,568.58	.....	
518-F	Aug. 3	Roy Price	Lateral excavation	2,350.00	2,350.00	
834	Aug. 4	Bucyrus Co.	Cl. 14 drag line	54,500.00	.....	
837	Aug. 13	Pawling & Harnischfeger.	206 drag lines	10,530.00	.....	
700-F	Aug. 17	Adams & Ash	Construction of 4-room cottage.	3,040.00	3,016.37	Oct. 15
	Aug. 31	Edgar Debrot	Grazing lease	33.33	33.33	Dec. 31
	...do	J. T. Sullivan	...do	9.00	9.00	Do.

[3] Completed. [6] First well. [7] Minimum per month. [8] Three years.

Principal current contracts—Continued.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1920. Sept. 1	Lingle Water Users' Association.	Payment of proportionate part of operation and maintenance of Whalen Dam and Interstate Canal.	.....	.....	
602-F	Sept. 2	Roy Price.....	Construction of laterals.....	$2,780.00	$1,626.00	1921. Nov. 30
22904	Sept. 10	Coast Fir Lumber Co.	Lumber.....	4,177.16	.....	
601-F	Sept. 11	J. C. Hinds.....	Construction of laterals.....	3,615.00	3,114.30	Dec. 1
	Sept. 14	Olaf Oberg.....	Lease of building for camp purposes.	120.00	75.00	
2283	Sept. 17	Sterns-Rodgers Mfg. Co.	3 4 by 5 cast-iron gates.....	900.00	.....	
603-F	...do....	L. R. Small.....	Construction of earthwork....	1,996.25	2,357.32	Mar. 19
	Sept. 20	White Motor Truck Co.	Hauling balanced needle valve castings to Pathfinder Dam.	6,000.00	6,000.00	
	Sept. 23	Pleasant Valley Lateral Association.	Payment of proportionate part of operation and maintenance of Whalen Dam and Interstate Canal.	.....	.....	
23106	Sept. 25	United States Portland Cement Co.	Cement.....	2,385.00	.....	
	Sept. 27	Evaline Gonden....	Use of well for water supply to camp 20.	150.00	50.00	
23221	Sept. 29	United States Portland Cement Co.	Cement.....	2,355.00	.....	
23235	Oct. 2	Three Forks Portland Cement Co.	.....do.....	3,757.50	.....	
519-F	Oct. 4	Wess Gletty.....	Hauling gravel.....	1,200.00	1,425.00	1920. Oct. 29
23330	...do....	Colorado Portland Cement Co.	Cement.....	9,000.00	.....	
605-F	...do....	Wess Gletty.....	Construction of earthwork....	2,158.00	2,573.95	1921. Apr. 14
606-F	Oct. 5	L. R. Small.....	.....do.....	1,913.00	1,949.81	June 1
	Oct. 14	E. S. Wildy.....	Lease of land for buildings for camp purposes.	150.00	75.00	
521-F	Oct. 23	C. R. Lacy.....	Construction of earthwork....	1,145.50	845.30	Feb. 10
701-F	Oct. 25	W. R. Veneman and Iven C. Hodgell.	Enlargement of Sheep Creek Diversion Channel.	460.00	528.08	1920. Dec. 19
23594	Oct. 27	Colorado Portland Cement Co.	Cement.....	2,360.00	.....	
	Oct. 29	Chicago, Burlington & Quincy R. R. Co.	High-tension transmission line crossing.	.....	.....	
522-F	Oct. 30	S. L. Smith.....	Hauling gravel.....	748.00	858.50	Dec. 31
23739	Nov. 5	Continental Oil Co..	Gasoline and Oil.....	1,211.00	.....	
23517	Nov. 16	Vulcan Iron Works.	C. T. gates.....	1,831.89	.....	
702-F	Nov. 22	H. C. Copsey.....	Gravel lining, Interstate Canal banks.	1,875.00	1,877.25	1921. Feb. 23
23814	Nov. 26	Vulcan Iron Works.	9 18-inch gates.....	310.50	.....	
	Nov. 29	Chicago, Burlington & Quincy R. R. Co.	Lease of site for warehouse on railroad right of way.	25.00	.....	
704-F	Dec. 3	Paige & Veneman...	Excavation of Dry Spotted-tail Diversion Channel.	825.00	603.90	Jan. 12
24011	Dec. 4	Continental Oil Co..	Gasoline and oil.....	1,144.00	.....	
24011	...do....	Sinclair Refining Co.	.....do.....	2,062.00	.....	
	Dec. 7	City of Mitchell, Nebr.	Damage claim.....	19.30	19.30	
703-F	Dec. 11	Chas. McKinnon and D. C. Warner.	Excavation and extension of.	176.00	222.86	May 1
	Dec. 16	Peter Cawiezel.....	Damage claim.....	25.00	25.00	
237-D	Dec. 17	Prentice Bros.....	Construction of concrete highway bridge.	3,408.30	3,836.96	May 28
24145	Dec. 20	Colorado Portland Cement Co.	Cement.....	2,315.00	.....	
	...do....	Luther R. Stiver....	Grazing lease.....	109.20	109.20	1920. Dec. 31
	Dec. 24	Caldwell Mutual Telephone Co.	Furnishing telephone wire in consideration for damage done.	210.00	193.00	

Principal current contracts—Continued.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1920. Dec. 24	Mitchell Valley Mutual Telephone Co.	Furnishing telephone wire in considhration for damages done.	$630.00	$580.00	
	...do.....	Diamond Mutual Telephone Co.	.....do.....	375.00	345.00	
	...do.....	Platte Valley Telephone Co.	.....do.....	450.00	412.50	
23742	Dec. 27	P. D. Whitaker Ranch Light & Power Co.	2 lighting plants.....	855.00	.....	
	Dec. 31	H. D. Bashford.....	Grazing lease.....	167.28	55.76	1923. Dec. 31
	...do.....	Henrietta Judd Mann.	.....do.....	192.00	64.00	Do.
	...do.....	G. W. Gamble.....	.....do.....	253.68	84.56	Do.
	...do.....	C. B. Ewing.....	.....do.....	192.00	64.00	Do.
	...do.....	John C. Beach.....	.....do.....	240.00	80.00	Do.
	...do.....	Nick Prekeges.....	.....do.....	72.00	72.00	Do.
	...do.....	Perry Braziel.....	.....do.....	140.01	46.67	Do.
	...do.....	J. R. Russell.....	.....do.....	283.86	94.62	Do.
	...do.....	Mrs. J. O. Bissell & Sons.	.....do.....	333.00	111.00	Do.
	...do.....	Joseph A. Yanda.....	.....do.....	349.20	116.40	Do.
	...do.....	Ray Roberts.....	.....do.....	403.02	134.34	Do.
	...do.....	E. F. Hurdle.....	.....do.....	96.00	96.00	Do.
	...do.....	Chas. Frederick, sr..	.....do.....	334.02	111.34	Do.
	...do.....	Vernon Spurrier.....	.....do.....	224.10	74.70	Do.
	...do.....	A. R. Downar.....	.....do.....	254.40	84.80	Do.
	...do.....	F. E. Jones.....	.....do.....	1,333.14	444.38	Do.
	...do.....	Lewis Chalupa.....	.....do.....	296.13	98.71	Do.
	...do.....	Clarence Townley...	.....do.....	518.61	172.87	Do.
	...do.....	C. D. Fullerton.....	.....do.....	143.25	47.25	Do.
	...do.....	John H. Kellums....	.....do.....	666.48	222.16	Do.
	...do.....	Chas. Frederick, jr..	.....do.....	420.66	140.22	Do.
	...do.....	Chicago, Burlington & Quincy Railroad Co.	Construction of Northport Canal across Chicago, Burlington & Quincy Railroad right of way.	6,060.00	.....	
	...do.....	B. F. Yoder.....	Grazing lease.....	2,039.58	679.86	Do.
	...do.....	Bert Scott.....	.....do.....	252.00	84.00	Do.
	...do.....	A. B. Fowler.....	.....do.....	346.98	115.66	Do.
	...do.....	L. F. Kellums.....	.....do.....	528.00	176.00	Do.
	...do.....	Walter D. Baldwin..	.....do.....	75.00	75.00	Do.
	...do.....	Chas. R. Meyer.....	.....do.....	450.00	148.98	Do.
	...do.....	A. N. Mathers.....	.....do.....	2,006.52	668.84	Do.
	...do.....	A. N. Krionderis....	.....do.....	394.80	131.60	Do.
	...do.....	J. E. Lawertew.....	.....do.....	96.00	96.00	Do.
	...do.....	Ralph E. Robinson..	.....do.....	264.66	88.22	Do.
	...do.....	Harvey Beebe.....	.....do.....	210.00	70.00	Do.
	...do.....	B. E. Spencer and Opal K. McCaffree.	.....do.....	153.60	51.20	Do.
	...do.....	C. E. Wineteer.....	.....do.....	432.00	144.00	Do.
	...do.....	Harry W. Roberts..	.....do.....	151.20	50.40	Do.
	...do.....	Frank Chalupa.....	.....do.....	622.80	207.60	Do.
	...do.....	David Wylie.....	.....do.....	91.17	91.17	Do.
	...do.....	W. O. Howard.....	.....do.....	360.00	120.00	Do.
	...do.....	Henry Herman.....	.....do.....	228.06	76.02	Do.
	...do.....	Jas. A. Joplin.....	.....do.....	192.00	64.00	Do.
	...do.....	Guy Lewis and E. H. Jacobs.	.....do.....	445.29	148.43	Do.
	...do.....	Frank V. Beal.....	.....do.....	121.62	40.54	Do.
	...do.....	Ben F. Franklin....	.....do.....	198.00	66.00	Do.
	...do.....	Ida M. Roberts.....	.....do.....	541.47	180.49	Do.
	...do.....	Harmon L. Ouderkirk.	.....do.....	1,525.44	508.48	Do.
	...do.....	W. H. Lyman.....	.....do.....	355.29	118.43	Do.
	...do.....	O. W. Campbell.....	.....do.....	69.81	69.81	Do.
	...do.....	H. L. Sams.....	.....do.....	138.60	46.20	Do.
	1921. Jan. 6	City of Casper, Wyo.	Furnishing water from Pathfinder Reservoir.	180.00	180.00	1921 Mar. 31
	...do.....	E. A. Snipes.....	Drainage claim.....	25.00	25.00	
	...do.....	Tom Sun.....	Grazing lease.....	533.98	167.82	Dec. 31
	...do.....	B. B. Brooks.....	.....do.....	291.11	91.49	Do.
	...do.....	R. H. Nichols.....	.....do.....	753.67	236.87	Do.
	...do.....	S. L. Robbins.....	.....do.....	50.00	50.00	Do.
	Jan. 20	J. C. Glasgow.....	.....do.....	50.00	50.00	Do.
	...do.....	Chris. R. Schwieger.	.....do.....	62.40	62.40	Do.
	...do.....	B. B. Brooks.....	.....do.....	740.25	232.65	Do.

Principal current contracts—Continued.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1921.					
24397	Jan. 28	Sterns Rodgers	Metal work, drawing No. 20-E-219.	$195.00		
24608	Jan. 29	Vulcan Iron Works Co.	Valve repairs	1,298.00		1921.
	Feb. 2	B. F. Yoder	Grazing lease	160.00	$53.33	Dec. 31
24377	Feb. 11	Gering Foundry	Concrete pipe forms	729.66		
24890	Feb. 14	Colorado Portland Cement Co.	Cement	2,340.00		
	Feb. 15	Chicago, Burlington & Quincy R. R. Co.	Lease of site for warehouse	25.00		
24833	Feb. 26	Byron Jackson Iron Works.	2 turbine pumps with motor.	4,876.40		
	Mar. 1	G. C. McProud	Damage claim	100.50	100.50	
	Mar. 10	Owl Creek Mutual Telephone Co.	Cooperation in correcting unsatisfactory telephone service.	150.00		
	Mar. 21	Morrill Drainage District.	Supplemental contract, repairs to Sheep Creek outlet and subsequent operation and maintenance.	[9] 4,800.00		
705-F	Mar. 9	J. R. McMahon	Canal repair work	300.00	260.30	Apr. 30
25272	Mar. 17	Colorado Portland Cement Co.	Cement	2,235.00		
703-F	Mar. 18	H. C. Copsey	Lateral excavation	118.00	174.46	May 1
523-F	Mar. 19	J. W. Huffman	Removal of earth plugs	454.75	595.00	May 15
706-F	Mar. 23	C. E. Cross	Excavation of draintile line	523.00	1,173.14	May 1
524-F	Mar. 25	F. M. Sanders and Floyd M. Sanders.	Lateral extension and back fill of structures.	1,424.00	1,770.88	May 28
707-F	Mar. 26	J. W. Talmage	Lateral earthwork	192.00	215.88	Apr. 24
708-F	...do	...do	Excavation drainage outlet channel.	840.00	753.10	May 1
	Mar. 31	C. A. Keebaugh and Geo. B. Derby.	Lease of land for farming purposes.	400.00	400.00	
	Apr. 2	R. E. Elquist	Damage claim	225.00	225.00	
607-F	Apr. 5	J. C. Hinds	Drilling holes for blasting	870.00	683.88	Apr. 15
525-F	Apr. 6	M. Connery and A. E. Buck.	Gravel haul	555.00	789.00	June 13
527-F	Apr. 12	H. C. Copsey	Lateral construction	394.00	546.00	May 25
528-F	...do	D. F. Scotts and H. C. Pollock.	Gravel haul	390.00	856.50	June 14
528-F	...do	Frank McCracken	...do	525.00	784.00	Do.
707-F	Apr. 15	C. J. Cadwelland M. S. Reynolds.	Lateral earthwork	180.00	180.00	May 1
528-F	...do	Emil Carlson	Gravel haul	770.25	1,043.25	June 14
	Apr. 16	C. H. Dechert	Lease of land for farming purposes.	[10]		
	...do	W. E. Ross	...do	[10]		
529-F	Apr. 20	J. W. Kingsley	Gravel haul	800.00	613.20	July 15
529-F	...do	Clark, Clark & Berry	...do	1,615.00	952.42	Do.
529-F	...do	Angell & Williams	...do	935.00	464.52	Do.
530-F	Apr. 22	Frank M. Baumgardner and Carl Wilson.	...do	1,393,10	1,179.60	Do.
531-F	Apr. 26	Fred D. Mullen	Lateral earthwork	3,435.50	1,214.46	Aug. 15
526-F	Apr. 27	E. E. Prickett	...do	4,151.20	1,613.63	July 15
709-F	Apr. 28	Golden & Surber	Construction of 1 car garage	318.00	320.00	May 10
608-F	Apr. 29	L. R. Small	Lateral earthwork	1,080.00		Aug. 1
611-F	Apr. 30	J. C. Hinds	Canal and lateral earthwork	525.00	577.46	June 15
611-F	...do	J. F. McAllister	...do	845.00	172.50	Aug. 1
527-F	May 1	C. E. Cross	Lateral excavation	716.50		July 15
608-F	May 2	H. C. Copsey and Lanee Conry.	Lateral earthwork	1,330.00	825.00	Aug. 1
608-F	...do	W. C. Broadbent	...do	1,008.00	675.00	Do.
609-F	...do	...do	...do	483.00	571.55	May 28
532-F	May 3	Roy Lathrop and A. H. Joy.	...do	996.80	726.00	July 15
535-F	May 9	H. C. Lamb	Excavation, wasteway channel.	385.00	374.00	June 10
612-F	...do	Edward L. Goll	Gravel haul	576.00	890.40	June 15
26062	May 10	Colorado Portland Cement Co.	Cement	3,820.00		1
						1923.
	...do	City of Torrington, Wyo.	Purchase of electrical energy.	25,000.00	1,602.43	May 10

[9] And one-half of annual operation and maintenance.

[10] Crop rental.

Principal current contracts—Continued.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1921.					
26063	May 11	Nebraska Cement Co.	Cement	$2,802.93	.....	
26070	May 13	Coast Fir Lumber Co.	Lumber	2,405.66	.....	
26069	May 14	.....do	.....do	1,438.61	.....	
26071	...do	.....do	.....do	1,453.53	.....	
533-F	...do	W. C. Broadbent	Lateral earthwork	2,900.00	$730.00	1921. Aug. 1
26066	...do	W. S. Dickey Clay pipe Manufacturing Co.	18 by 24 inch vitrified sewer	1,219.50	.....	
26067	...do	.....do	.....do	2,844.00	.....	
26068	...do	.....do	.....do	1,224.00	.....	
	May 15	Burley Fisher	Lease of land for farming purposes.	(10)	.....	
	...do	Olof O. Gummus	.....do	125.00	125.00	
	May 18	Chicago, Burlington & Quincy R. R. Co.	Construction of spur track	2,500.00	.....	
	May 21	Wyatt-Wolf Motor Co.	Hauling supplies to Pathfinder Dam.	6,475.00	241.19	
613-F	May 25	Joe Crumrine	Construction of lateral structures.	992.00	370.00	Sept. 1
532-F	May 28	Joseph B. Moore and Thomas W. Bracken.	Lateral earthwork	3,512.00	2,679.00	July 15
26310	...do	Continental Oil Co.	Gasoline and oil	1,074.00	.....	
26310	...do	Standard Oil Co.	.....do	1,081.00	.....	
536-F	...do	Jim Ashburn	Construction of Main Canal turnouts.	1,351.00	338.80	Aug. 15
537-F	June 1	Shigley & Warner	Construction of lateral structures.	1,959.20	432.10	Sept. 15
614-F	June 4	J. C. Hinds	Lateral earthwork	844.50	.....	Sept. 1
710-F	...do	Fred M. Elliott and Lester Skeen.	Back fill, drain tile line	305.00	160.00	Aug. 1
614-F	...do	J. F. McAllister	Canal and lateral earthwork	1,043.75	125.00	Sept. 1
	June 10	Thurlow Thompson.	Lease of land and buildings for camp purposes.	212.50	.....	
538-F	June 11	W. B. Knott	Lateral extension	570.00	579.15	June 28
534-F	June 15	C. E. McIntosh	Back fill, Lateral 35.4 Siphon.	934.50	160.20	Aug. 1
711-F	...do	Levi F. Owen	Construction of three drainage pump houses.	663.00	265.20	July 20
539-F	June 20	Chas. Hills	Gravel haul	500.00	140.00	Sept. 1
540-F	June 23	Prentice Bros	Construction of lateral structures.	4,892.75	.....	Sept. 15
541-F	June 29	H. C. Copsey	Gravel haul	829.50	.....	Oct. 1

NEVADA, NEWLANDS PROJECT.

DISBURSEMENTS.

	1917.				
	July 1	County of Churchill, Nev.	Telephone service	[11] $480.00	$1,920.00	(12)
	...do	City of Fallon	Light and water	[11] 125.00	475.00	(13)
	1918.					1920.
	June 6	Utah-Nevada-Idaho Telephone Co.	Telephone service	[11] 24.00	54.00	Sept. 30
	1919.					
	July 1	City of Fallon	Electrict energy	[11] 180.00	330.00	(13)
	Nov. 7	County of Churchill.	Roads across canal	None.	None.	(13)
	Nov. 28	Director General of Railroads.	Maintenance of spur track	[11] 175.00	223.00	(14)
	1920.					
	May 4	C. H. Hancock	Excavation, schedule 5, Brown Lateral.	427.00	427.00	July 5
	May 5	Meister Bros	Excavation, schedules 1, 2, 3, and 4, Gault Lateral.	2,028.00	2,028.00	July 3

[10] Crop rental.
[11] Yearly.
[12] Indefinite; terminated by contract of Oct. 1, 1920.
[13] Terminated by contract of Oct. 1, 1920.
[14] Indefinite.

Principal current contracts—Continued.

NEVADA, NEWLANDS PROJECT—Continued.

DISBURSEMENTS—continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1920.					1920.
	May 7	Rudolf Miller	Liquidation of damage	$250.00	$250.00	July 14
	June 4	E. K. Wood Lumber Co.	Lumber	1,938.00	1,938.00	Sept. 13
	July 1	Fallon Steam Laundry.	Towell supply	13.00	13.00	June 30
	...do	Nevada Products Co.	Ice	15.00	15.00	Do.
	Aug. 12	Austin Machinery Corp.	Drag-line excavator	9,400.00	4,700.00	1921.
	Aug. 14	Pawling & Hornsischferger.	No. 208 drag-line excavator	17,170.00	None.	June 18
	Aug. 26	G. W. Coverston	Dismissal of claim	None.	None.	1920.
	Aug. 27	Paul R. Jackson	Excavation, schedule 1, Gault Lateral.	880.00	880.00	Sept. 26
	...do	D. H. Cashman	Schedule 2, Gault Lateral	906.00	906.00	Do.
	Aug. 28	John C. Bell	Schedule 3, Gault Lateral	798.00	798.00	Sept. 27
	Sept. 27	Ida M. Rosencrans	Lease of quarters	53.00	53.00	Nov. 30
	Oct. 1	Bell Telephone Co. of Nevada.	Telephone service	[11] 24.00	18.00	([14])
	...do	City of Fallon	Electric current and water	[11] 360.00	225.00	([14])
	Oct. 20	Mrs. W. P. Van Meter.	Lease of quarters	24.00	24.00	Dec. 31
	Oct. 25	...do	Furnishing meals	398.00	398.00	Do.
	Nov. 6	Bucyrus Co	2 class 14 drag-line machines.	107,736.00	26,989.00	1921. June 20
	Nov. 3	D. H. Cashman	Excavation, schedule 1, Rabjohn Lateral.	394.00	394.00	1920. Dec. 31
	Nov. 30	Mrs. Joseph Giraud	Lease of quarters	30.00	30.00	Do.
	Dec. 27	P. D. Whitaker Ranch Light & Power Co.	4 Lighting sets	1,710.00	698.00	([15])
	1921. Feb. 2	Alexander Jacobs	Liquidation of damages	35.00	35.00	([16])
	Feb. 9	R. Hardesty Manufacturing Co.	Gate lifts	309.00	309.00	([15])
	Mar. 3	A. Weishaupt	Excavation, schedules 2 and 3, Dalton Lateral.	532.00	532.00	1921. Mar. 18
	Mar. 4	Acme Lumber Co	Lumber	2,046.00	2,046.00	Mar. 15
	...do	C. H. Hancock	Earthwork, schedule 1, Dalton Lateral.	307.00	307.00	Mar. 19
	Mar. 18	W. A. Paul	Excavation, schedule 1, Hardy Lateral.	162.00	162.00	Apr. 2
	...do	Homer V. Lattin	Schedule 2, Thompson Lateral, and schedule 3, Latin Lateral.	284.00	284.00	Do.
	...do	C. H. Hancock	Schedule 4, Wiggins Lateral.	101.00	101.00	Do.
	Apr. 23	Meister Bros	Schedules 1 and 2, Harding Lateral.	257.00	257.00	May 12
	May 4	Burdick Enamel Sign Co.	Weir gages	56.00	None.	([15])
	May 9	Lattin Bros	Schedule 1, J extension lateral.	214.00	214.00	May 24
	...do	Weishaupt & Kirn	Schedule 2, Pierson waste-water ditch.	145.00	145.00	Do.
	June 16	J. A. Wood	Schedule 1, Lisle Lateral	284.00	None.	July 11,

COLLECTIONS.

	1909. Apr. 1	Frank Coffin	Furnishing water for domestic purposes.	$700.00	$523.00	([14])
	...do	Western Ore Purchasing Co.	...do	1,000.00	735.00	([14])
	1911. Aug. 18	W. A. Keddie	Lease of grazing land	384.00	384.00	1921. Aug. 17

[11] Yearly.
[14] Indefinite.
[15] Not stated.
[16] Payment of voucher.

Principal current contracts—Continued.

NEVADA, NEWLANDS PROJECT—Continued.

COLLECTIONS—continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1912. June 1	D. D. Middleton	Furnishing water for domestic purpose.	$250.00	$162.00	(14)
	July 1	Firebaugh Bros	Lease of grazing land	244.00	219.00	1922. June 30
	1913. Sept. 1	F. W. Dudley and C. E. Firebaugh.	do	512.00	410.00	1923. Aug. 31
	Aug. 1	Edwin Wade and J. C. Shepard.	do	464.00	371.00	July 31
	1914. July 10	Canyon Power Co	Lease of power plant	150,000.00	103,655.00	1924. Nov. 30
	1917. Mar. 27	F. H. Sears	Lease of land for agricultural purposes.	[17] 2,000.00	1,500.00	1922. June 12
	1918. Jan. 29	C. E. Kent	Lease of grazing land	2,656.00	1,062.00	1927. Nov. 15
	Apr. 16	A. J. Rankin	do	602.00	602.00	1922. Apr. 15
	Mar. 25	C. E. Kent	do	192.00	77.00	1927. Nov. 15
	Mar. 13	A. Mussie & Sons	do	240.00	72.00	Do.
	1919. Mar. 25	C. E. Kent	do	1,100.00	660.00	1923. Dec. 1
	May 22	O. J. Leet	do	384.00	115.00	1928. Dec. 1
	Sept. 12	John Garaventa	do	1,550.00	620.00	1924. Dec. 1
	Nov. 3	State of Nevada Department of Highways.	Lease of mess house	360.00	360.00	1920. Nov. 2
	Nov. 7	do	Lease of dormitory	120.00	120.00	Do.
	Mar. 3	R. H. Moore	Lease of tractor	560.00	560.00	July 31
	1920. Oct. 4	State of Nevada, Department of Highways.	Lease of dormitory and mess house.	480.00	320.00	1921. Nov. 2
	1921. Jan. 21	Truckee Carson Irrigation District.	Repayment of construction cost of drainage system.	700,000.00	None.	(14)

NEW MEXICO, CARLSBAD PROJECT.

609	1920. July 17	Wm. T. Reed	Lease of room for printing office.	[18] $25.00	$140.00	1922. July 31
624	Sept. 1	I. W. Floyd	Lease of graznig lands	1,764.00	588.00	1923. Aug. 31
612	Sept. 15	State National Bank	Partial assignment of contract with Wm. Jones.	516.60	258.30	1922. Sept. 15
614	Sept. 22	Pecos Water Users' Association.	Preliminary investigations, etc., in re proposed extension to Carlsbad project.	10,000.00	2,500.00	(19)
613	Nov. 15	Parker & LaRoe	Lease of 12-wheeled scrapers	[18] 120.00	240.00	(3)
625	Nov. 22	Atchison, Topeka & Santa Fe Ry. Co.	Storage yard and warehouse site.	180.00	90.00	Aug. 8

[3] Completed.
[14] Indefinite.
[17] Estimated value based on improvement to land; no cash consideration.
[18] Per month.
[19] Not provided.

Principal current contracts—Continued.

NEW MEXICO, CARLSBAD PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
615	1920. Dec. 15	Bert Rawlins	Lease of 2 rooms, U. S. Reclamation Service Office Building.	[18] $10.00	$65.00	([19])
621	Dec. 31	M. C. Lee	Lease of grazing lands	263.88	87.96	1923. Dec. 31
622	...do	Lewis Howell	...do	380.40	126.80	Do.
623	...do	Geo. M. Williams	...do	726.00	242.00	Do.
627	...do	John Fanning	...do	278.55	92.85	Do.
626	1921. Jan. 1	Bob Gushwa	...do	275.88	91.96	Do.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

	1921. Jan. 3	Walker & Johnson	Earthwork, Canutillo Canal, schedules 1 and 2.	$2,946.20	$2,842.00	1921. Mar. 1
	...do	Wm. H. Mundy	Earthwork, Canutillo Canal, schedules 3 and 4.	3,057.97	2,198.15	Do.
	...do	Lee Harlan	Earthwork, Canutillo Canal, schedule 5.	1,417.04	1,588.56	Do.
	...do	S. W. Love	Earthwork, Canutillo Canal, schedule 6.	958.34	969.54	Do.
	...do	Mahoney & Runquist.	Earthwork, Canutillo Canal, schedules 7 and 8.	2,851.25	3,667.00	Do.
	...do	N. Abraham	Earthwork, Canutillo Canal, schedules 9, 10, 11, and 12.	4,192.15	3,465.24	Do.
	...do	F. G. Belk	Earthwork, Canutillo Wasteway, schedule 13.	362.64	292.33	Do.
			Cleaning.			
	Jan. 27	...do	La Union Canal, schedule 1	767.00	534.31	Do.
	...do	Jose Viramontes	La Union Canal, schedule 2	812.00	929.34	Do.
	...do	Andencio Enriquez	La Union Canal, schedule 3	767.00	880.43	Do.
			Earthwork and cleaning.			
	Jan. 15	Felix S. Carrillo	Quesenberry Lateral, schedule 1.	617.16	615.16	Feb. 15
	...do	Nicholas A. Gehl	Mesilla Lateral, schedule 1	1,859.60	1,857.60	Do.
	...do	E. E. Moreno and Pat Hogan.	San Miguel Lateral, schedule 1	1,670.68	1,668.68	Do.
	...do	H. A. Walters	American Bend Lateral, schedule 1.	376.21	374.21	Do.
	...do	F. T. Lopez and Ramon A. Moralez.	Dona Ana Lateral, schedules 1, 2, and 3.	2,956.63	2,950.63	Do.
	...do	H. C. Mandell	La Union East Lateral, schedules 1, 2, and 3.	3,067.02	3,033.49	Do.
	...do	Charles H. Utting	Las Cruces Lateral, schedule 1	2,333.02	2,329.02	Do.
	...do	H. A. Walters	Picacho Branch Canal, schedule 1.	416.23	414.23	Do.
	...do	Herny R. Fitch	Barrio Lateral, schedule 1	968.00	966.00	Do
	...do	C. Moralez	Three Saints Lateral, schedule 1.	946.25	944.25	Do.
	...do	Augustin Baca	Tortugas Lateral, schedule 1	325.68	323.68	Do.
	...do	Keith E. Gehl	Laguna Lateral, schedule 1	771.92	769.92	Do.
	...do	Nicholas A. Gehl	Louisiana Lateral, schedule 1	740.40	738.40	Do.
	...do	Chas. P. Sykes	Berino Lateral, schedule 1	172.40	256.20	Do.
	...do	C. R. Richards	Chamberino Lateral, schedule 1.	840.55	1,001.00	Do.
	Jan. 3	Pete Trujillo and Blas Loya.	Wadlington Lateral, schedule 1.	548.95	546.96	Do.
	...do	Pilar Grijalba, Paula Silva, and Plutarco Silva.	Canas Agrias Lateral, schedule 1.	191.00	189.00	Do.
	...do	A. B. Carbajal	Cuadrilla Lateral, schedule 1.	350.66	348.66	Do.
	...do	C. O. Serna	Ysla Lateral, schedules 1 and 2.	2,392.83	2,388.83	Do.
	...do	W. T. Duncan	Jornado Lateral, schedule 1	689.68	687.68	Do.
	...do	Canoto Trujillo	Green Lateral, schedule 1	314.24	312.24	Do.
	...do	Tilor Grijalba, Paulo Silva, and Plutarco Silva.	Upper Clint Lateral, schedule 1.	486.80	484.80	Do.

[18] Per month.

[19] Not provided.

Principal current contracts—Continued.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
			Earthwork and cleaning—Con.			
	1921. Jan. 3	N. Dominguez	Juan d'Herrera Lateral, schedules 1 and 2.	$3,379.27	$3,375.27	1921. Feb. 15
	...do	Manuel Madrid et al.	San Elizario Lateral, schedule 1.	1,123.25	1,121.25	Do.
	...do	Valentine Nunez	Rodrigueua Lateral, schedules 1 and 2.	254.33	252.33	Do.
	...do	Jose Chavez	Bovee Lateral, schedule 1	222.64	220.64	Do.
	...do	Andres G. Hernandez et al.	Daugherty Lateral, schedule 1.	247.63	245.63	Do.
	...do	C. M. Brooks	Clint Lateral, schedules 1, 2, and 3.	3,247.96	3,243.96	Do.
834	1920. Aug. 4	Bucyrus Co	1 class 14 drag line	56,000.00	(20)	
835	Aug. 14	...do	1 30-B drag line	18,895.00	18,895.00	
837	Aug. 13	Pawling & Harnischfegher Co.	2 No. 206 drag lines and parts	22,106.20	22,106.20	
		Austin Machine Co.	1 ditch cleaner	10,000.00	.....	
845	1921. Jan. 20	Lee Moore Contracting Co.	Earthwork, Salitral Lateral	32,010.90	32,010.90	Feb. 20
847	Jan. 31	Jennings Construction & Engineering Co.	Earthwork, Tornillo Drain	32,500.00	15,639.13	Nov. 11
			Cleaning banks.			
	Feb. 1	H. A. Walters	Leasburg Canal, schedule 19	265.09	265.09	Feb. 15
	...do	James E. Haines	Leasburg Canal, schedule 20	211.38	211.38	Do.
	...do	W. E. White	Mesilla Lateral, schedule 2	344.00	344.00	Do.
	...do	...do	Laguna Lateral, schedule 4	112.40	112.40	Do.
	...do	...do	California Lateral, schedule 5	114.10	114.10	Do.
	...do	...do	Brazito Middle Lateral, schedule 17.	56.70	56.70	Do.
	...do	...do	Brazito East Lateral, schedule 18.	31.20	31.20	Do.
	...do	G. Griffith	San Miguel Lateral, schedule 11.	170.40	170.40	Do.
	...do	C. R. Richards	Chamberino Lateral, schedule 12.	306.18	306.18	Do.
	...do	P. H. Bailey	La Union West Lateral, schedules 14 and 15, and Little La Union West Lateral, schedule 16.	391.26	391.26	Do.
	...do	C. Moralez	San Jose Lateral, schedule 8	114.80	114.80	Do.
	...do	...do	Three Saints Lateral, schedules 6 and 7.	359.80	359.80	Do.
	Feb. 25	F. T. Lopez and R. A. Moralez.	Lester Lateral, schedule 2	919.00	1,154.00	Mar. 10
	...do	E. L. Ray	Louisiana or Rae Lateral extension.	898.25	842.50	Do.
	Jan. 21	Vulcan Iron Works Co.	Gate hoists, Franklin Canal headworks, schedule 4.	2,600.00	2,080.00	
	Jan. 24	Stearns-Rogers Manufacturing Co.	Hoisting machinery, Franklin Canal headworks, schedule 2.	2,900.00	2,320.00	
	Jan. 28	Minneapolis Steel & Machinery Co.	Radial and weir gates and accessories, Franklin Canal headworks, schedules 1 and 3.	3,660.00	2,795.20	
	Apr. 21	National Marine Engine Works.	Pistons for balanced valves, Elephant Butte Dam.	4,100.00	.....	

OREGON, UMATILLA PROJECT.

	1921. Feb. 8	J. K. Shotwell	Furnishing gravel for concrete lining Canal A.	$2,400.00	$2,709.60	1921. Mar. 20
	Mar. 12	W. A. Mikesell	Cultivation of land adjacent to Cold Springs Dam and Reservoir.	4,431.50	.....	1925. Dec. 1

[20] Order canceled.

Principal current contracts—Continued.

OREGON-CALIFORNIA, KLAMATH PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1921. June 13	W. D. Miller	Construction of diversion dam on Lost River.	$28,118.50	.....	1921. Dec. 31

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
853	1921. Apr. 26	Threet Bros.	Earthwork, Willow Creek Lateral extension.	$47,910	$3,856.61	1922. Apr. 1
	May 9	Milan Malcolm	Construction cottage at head of Johnston Lateral.	1,821	1,000.00	1921. June 30

WASHINGTON, OKANOGAN PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1921. Jan. 7	Okanogan Valley Power Co.	Furnishing electric power	$17,000.00	$2,351.23	1923. Oct. 1 1920. June 30

WASHINGTON, YAKIMA PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
			Sunnyside Division.			
	1920. Nov. 30	Martin and Harold Strandwold.	Drilling wells	$800.00	$800.22	1921. Jan. —
			Ticton Division.			
	Oct. 16	F. C. Howard	Constructing two 5-room cottages.	5,294.00	5,294.00	1920. Dec. —
	Dec. 28	W. P. Hewes (Yakima Cement Products Co.).	Concrete pipe	3,728.00	3,728.00	1921. Mar. —
			Storage Division.			
	May 3	Lake Clealum Lumber Co.	Sale of timber	24,566.00	4,000.00	1924.
	...do....	Northern Pacific Lumber Co.	Sale of logs	65,000.00	6,000.00	1920. Sept. 28
			Moxee Division.			
	June 7	Yakima Irrigation District.	Survey and plans	11,250.00	11,250.00	1921. May —
			Roza Division.			
	July 6	Yakima-Benton Irrigation District.	Surveys and plans	36,000.00	20,500.00	Oct. —

WYOMING, SHOSHONE PROJECT.

DISBURSEMENTS.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1921. June 27	Aluminum Co. of America.	Aluminum cable for power plant.	$20,452.00	.....	(21)
	1920. Aug. 4	Bucyrus Co	Drag lines	54,602.00	.....	(21)
	1921. Jan. 3	Chicago, Burlington & Quincy R. R.	Site for fuel-oil storage tank.	5.00	.....	(22)
	Apr. 15	.....do	Lease of site for tile storage yard.	5.00	.....	(22)

[21] Indeterminate.

[22] Rate per annum.

Principal current contracts—Continued.

WYOMING, SHOSHONE PROJECT—Continued.

DISBURSEMENTS—continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1916. June 10	Chicago, Burlington & Quincy R. R.	Warehouse site, Deaver, Wyo.	$5.00	$25.00	(22)
	1919. Dec. 16	.....do.....	Warehouse sites, Powell, Wyo. (2).	10.00	10.00	(22)
	1907. Nov. —	.....do.....	Lease of site for coal shed, Cody.	5.00	65.00	(22)
	1921. Feb. 14	General Electric Co..	Electrical apparatus.....	44,500.00	.....	(21)
	1919. Sept. 1	Mountain States Telephone & Telegraph Co.	Telephone connections and exchange service.	2,000.00	300.00	(23)
	1921. Apr. 12	Pioneer Livery Barn	Hauling at Powell.....	998.00	236.00	(24)
	Feb. 16	Pittsburgh Valve, Foundry & Construction Co.	Motor-operated gate valve....	2,580.00	.....	(21)
	1918. Apr. 1	Project Telephone Co.	Telephone rental and exchange service.	2,000.00	422.00	(23)
	1919. Dec. 8	James W. Rousseau, county clerk.	Data on changes affecting ownership of land on project.	5,000.00	72.00	(23)
	1921. May 31	St. Paul Foundry Co.	Penstock connections and tunnel linings.	6,759.00	.....	(21)
	Feb. 1	Wellman, Seaver, Morgan Co.	Two needle valves (power plant).	12,610.00	.....	(21)
	Jan. 17	.....do.....	Two variable head turbines (power plant).	32,500.00	.....	(21)
	1920. Dec. 27	P. D. Whitaker Ranch Light & Power Co.	Willys lighting sets for drag lines.	7,584.00	.....	(21)
	1921. Feb. 4	Mike Brum.....	Claim for damages to crop....	100.00	.....	(25)
	1920. Aug. 7	W. A. Bullard.....	Earthwork, Part Three.....	1,725.00	1,595.00	1920. Nov. 25
	1921. Feb. 19	Clay Cherry.....	Refund of $85.10 overpayment on lease dated May 13, 1918.	85.00	85.00	(25)
	1920. Sept. 11	H. Downer.....	Earthwork, Part Three.....	6,514.00	5,635.00	Dec. 20
	Nov. 16	L. C. Freeman.....	Hauling to, from, and at Shoshone Dam.	1,068.00	2,100.00	(23)
	1921. Feb. 26	.....do.....	.....do.....	1,134.00	2,200.00	(23)
	May 2	.....do.....	.....do.....	2,492.00	4,078.00	(24)
	Jan. 10	Guy Hawley.....	Furnishing 500 yards granite rock in Garland Canal.	1,250.00	1,250.00	1921. Feb. 15
	1920. Aug. 9	W. E. Mitchell and E. H. Mitchell.	Earthwork, Part Three.....	1,897.00	2,817.00	1920. Nov. 27
	1921. May 11	.....do.....	Supplementary and amendatory of above.	.....	.....	
	1920. Aug. 10	Clarence A. Noland.	Earthwork, Part Three.....	1,582.00	1,750.00	Nov. 28
	1921. May 11	.....do.....	Supplementary and amendatory of above.	.....	.....	

[21] Indeterminate.
[22] Rate per annum.
[23] Governed by amount.
[24] Special contract; terminates at end of fiscal year.
[25] Terminated on payment of claim.

Principal current contracts—Continued.

WYOMING, SHOSHONE PROJECT—Continued.

DISBURSEMENTS—continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1920. Nov. 11	Orland, Sonsion, Folsom & Wells.	Sidewalk construction, Powell camp.	$525.00	$537.00	1921. May 10
	Nov. 17	Pioneer Livery Barn	Hauling, Garland Division....	697.00	950.00	(23)
	Oct. 16	E. C. Riley.....	Team hire.....	500.00	1,500.00	1920. Nov. —
	Dec. 3	F. S. Scott.....	Drilling test holes, Willwood Diversion Dam.	2,292.00	3,957.00	1921. Mar. 3
	July 29	J. D. Stone.....	Damage claim.....	202.00	202.00	(25)
	July 8	Minnie L. Watson...	Damages due to break, Lateral D.	100.00	100.00	(25)
	Nov. 17	Wilson, Ogden & Larkey.	Earthwork, Part Three.....	987.00	894.00	Jan. 6

COLLECTION.

	1921. Mar. 21	Axel R. Andren.....	Lease of Hans Nelson place, Shoshone Reservoir.	$1,100.00	$200.00	1925. Dec. 31
	1918. Sept. 19	Mrs. C. Andren.....	Lease of grazing lands, Shoshone Reservoir.	180.00	144.00	1922. Dec. 31
	1920. May 20	Jay Blood.....	Assignment of E. Wilder lease of Jan. 31, 1920, Shoshone Reservoir.	500.00	200.00	1924. Dec. 31
	...do....	.....do.....	Assignment of E. Wilder lease of Sept. 3, 1918, Shoshone Reservoir.	52.00	42.00	1922. Dec. 31
	1917. Apr. 18	Chas. A. Bradbury..	Lease of Ward place, Shoshone Reservoir.	760.00	560.00	1921. Dec. 31
	1918. June 10	Byron Drainage District.	Engineer's services.....	200.00	40.00	(21)
	Aug. 7	Cowley Drainage District.	.....do.....	200.00	118.00	(21)
	Sept. 10	G. V. Davis.....	Lease of land, Deaver town site.	175.00	117.00	1923. Dec. 31
	1920. Apr. 19	Town of Deaver.....	Domestic and municipal water supply.	42,000.00	1,200.00	1938. Apr. 19
	1919. May 6	.....do.....	Irrigation water.....	500.00	150.00	1928. May 6
	1921. May 24	Gilbert E. Gowey...	Lease of tract 8, Powell town site.	300.00	100.00	1923. Dec. 31
	1920. June 1	Cecil J. Huntington.	Lease of land, Shoshone Reservoir.	245.00	92.00	1924. Dec. 31
	1918. July 1	A. I. Jones.....	Lease of land, Deaver town site.	129.00	96.00	1922. Dec. 31
	1920. Oct. 22	F. W. Leete.....	.....do.....	100.00	43.00	1923. Mar. 31
	Sept. 30	Ed. T. Long.....	.....do.....	90.00	28.00	Dec. 31
	1919. Jan. 1	Elias Martin.....	Lease of Logan Ranch, Shoshone Reservoir.	500.00	300 00	Do.
	1917. Apr. 18	Nels Nordquist.....	Lease of Jensen place, Shoshone Reservoir.	370.00	370.00	1921. Dec. 31
	1918. Sept. 3	.....do.....	Lease of tract 4, Shoshone Reservoir.	280.00	224.00	1922. Dec. 31
	Mar. 12	Penrose Drainage District.	Engineer's services.....	200.00	57.00	(21)

21 Indeterminate. 23 Governed by amount. 25 Terminated on payment of claim.

Principal current contracts—Continued.

WYOMING, SOSHONE PROJECT—Continued.

COLLECTION—continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1921.	Completion due.
	1915. Dec. 13	Town of Powell	Domestic and municipal water supply.	$2,000.00	$808.00	1926. Mar. 14
	1919. Apr. 21	do	Irrigation water	750.00	1,652.00	1928. Oct. 1
	1921. June 24	do	Lease of Monighan drag line	300.00	300.00	(21)
	June 18	Chas. W. Taggart	Water rental, State school land.	200.00	145.00	1921. Oct. 30
	1918. June 6	do	Lease of Deaver town-site land and water.	1,680.00	939.00	1922. Dec. 31
	Sept. 3	Lee Upton	Lease of grazing land, Shoshone Reservoir.	728.00	578.00	Do.
	1919. Dec. 18	Axel Andren	Lease of Hans Nelson place, Shoshone Reservoir.	2,630.00	526.00	(26)
	May 31	J. F. Barr	Lease of tract 6, Powell town site.	95.00	95.00	1920. Dec. 31
	1918. May 13	Clay Cherry	Lease of tracts and 4, Powell town site.	3,252.00	1,756.00	(26)
	1919. Dec. 30	do	Supplemental, reducing area of land under lease of May 13, 1918.			

MISCELLANEOUS.

	1921. June 8	Chicago, Burlington & Quincy Railroad.	Road crossings at mileposts 6.78 and 4.77.			
	1917. Dec. 29	do	Right of way for concrete pressure pipe.			
	1918. Aug. 19	do	Right of way for Lateral S crossing tracks.			
	Aug. 2	do	Right of way for construction and operation and maintenance of canals and structures under tracks.			
	1921. Mar. 12	Illinois Pipe Line Co.	Crossing of pipe line at Deaver and Frannie Canal.			
	1919. July 10	Midwest Refining Co.	Right of way for 2-inch pipe line across Frannie Canal.			
	1921. June 6	State of Montana	Right of way for Frannie Canal.			
	Feb. 8	State Highway Commission of Wyoming.	Road crossings			

MONTANA, FLATHEAD (INDIAN) PROJECT.

858	1921. May 23	Russell & Hoye	Dry Creek Canal, concrete lining.	$47,625.39	$370.65	1922. June 1

21 Indeterminate. 26 Terminated by contractor.

UNIT BIDS AND CONTRACT PRICES ON FORMAL SPECIFCATIONS.

BACKFILL, PUDDLED.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Idaho, King Hill	Oct. 29, 1920		Main Canal:					
			Schedule 1	Cubic yards	1,150	$0.30		$0.30
			Schedule 4	do	300	1.05		1.05

BUILDINGS.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit. Lowest.	Bids per unit. Next.	Contract price.
Arizona, Yuma	May 23, 1921	83	Erecting, finishing, and painting 4 cottages for ditch riders:					
			Cottage No. 1	Each	1	$315.00	$365.00	$315.00
			Cottage No. 2	do	1	307.50	497.00	307.50
			Cottage No. 3	do	1	300.00	497.00	300.00
			Cottage No. 4	do	1	315.00	365.00	315.00
Montana, Milk River	Nov. 5, 1920	240-D	Headquarters cottage, Saco, Mont	do	1	1,017.90	None.	1,017.90
Do	Nov. 29, 1920	241-D	Three room cottage	do	1	875.00	937.00	875.00
Do	Dec. 31, 1920	244-D	Lodging house	do	1	2,021.00	2,250.00	2,021.00
South Dakota, Belle Fourche	Apr. 30, 1921		Constructing complete 3-room cottage	do	1	1,821.00	2,135.00	1,821.00

CONCRETE.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit. Lowest.	Bids per unit. Next.	Contract price.
Montana, Sun River	Apr. 14, 1921	395	Beale division structures, schedule 5	Cubic yard	350	$22.50	$25.00	$25.00

CONCRETE LINING.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit. Lowest.	Bids per unit. Next.	Contract price.
Montana, Flathead (Indian)	Apr. 12, 1921	396	Dry Creek Canal:					
			Finishing canal section	Linear feet	20,475	$0.17	$0.198	$47,625.30
			Concrete canal lining	Square foot	290,475	.129	.15	

Unit bids and contract prices on formal specifications—Continued.

EARTHWORK.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Milk River	Sept. 15, 1920	M. R. P. 24	Lateral NS-116-2-10:					
			Schedule 1	Cubic yard	13,000	$0.22	$0.24	$0.22
Do	Oct. 1, 1920	M. R. P. 25	Schedule 2	do	10,000	.21	.23	.21
			NS-141, V-85, V-108, VW-8:					
			Schedule 1	do	18,000	.24	.34	.24
			Schedule 2	do	5,000	.235	.249	.249
			Schedule 3	do	13,000	.219	.25	.219
			Schedule 4	do	1,200	.239	.249	.239
Do	Oct. 22, 1920	M. R. P. 26	Nelson Reservoir laterals and waste water ditches:					
			Schedule 1	do	9,800	.27		.27
			Schedule 2	do	1,100	.35		.35
			Schedule 3	do	1,000	.35		.35
			Schedule 4	do				
			Schedule 5	do	6,600	.198	.21	.198
Do	Nov. 3, 1920	M. R. P. 27	Lateral DS-50:					
			Schedule 1	do	1,000	.32		.32
			Schedule 2	do	800	.50		.50
Do	Apr. 1, 1921	M. R. P. 28	NR Canal:					
			Schedule 1	do	2,300	.18	.35	.18
			Schedule 2	do	3,000	.26	.285	.26
			Schedule 3	do	13,500	.19	.22	.19
			Schedule 4	do	4,000	.22	.23	.22
Do	May 24, 1921	M. R. P. 30	Vandalia Canal laterals and waste-water ditches:					
			Schedule 1	do	12,000	.15	.185	.15
			Schedule 2	do	6,000	.15	.16	.15
			Schedule 3	do	11,000	.15	.16	.15
			Schedule 4	do	4,500	.15	.1975	.15
Do	May 26, 1921	M. R. P. 32	NRS Canal, Lateral NN-O, schedule 1	do	1,000	.24	.26	.24
Do	June 1, 1921	M. R. P. 33	Dodson North Canal, Lateral DN-46	do	900	.15	.19	.15
Do	June 15, 1921	M. R. P. 34	Bowdoin Canal, Extension, Lateral B-48:					
			Schedule 1	do	9,000	.145	.1475	.1475
			Schedule 2	do	1,000	.1475	.1675	.1475
New Mexico-Texas, Rio Grande	Dec. 20, 1920	1RG-1921	Salitral Lateral:					
			Schedules 1 and 2, reconstruction	do	10,800	.30		.30
			Schedules 3, 4, and 5, reconstruction	do	17,620	.30	.33	.30
			Schedules 6, 7, and 8, reconstruction	do	18,100	.29	.30	.30
			Schedules 9 to 17, reconstruction	do	50,350	.30		.30

Do	do	2RG-1921	Crismore Lateral, schedules 1 to 4, reconstruction.	do	19,642	(1)	(1)	(1)
	Dec. 27, 1920	3RG-1921	Clint Lateral:					
			Schedule 1, cleaning	do	5,518	.27	.28	.27
			Schedule 2, cleaning	do	5,830	.27	.30	.27
			Schedule 3, cleaning banks	Square yards	35,080	.20-.39	.01	.20-.39
Do	do	4RG-1921	Juan de Herrera Lateral:					
			Schedule 1, cleaning	Cubic yards	5,731	.30	.3066	.30
			Schedule 2, cleaning	do	6,494	.255	.27	.255
Do	do	5RG-1921	Ysla Lateral:					
			Schedules 1 and 2, cleaning	do	9,368	.255	.28	.255
			Schedule 3, cleaning banks	Square yards	25,600	.01		Rejected.
Do	do	6RG-1921	San Elizario lateral:					
			Schedule 1, cleaning	Cubic yards	4,485	.25		.25
			Schedule 2, cleaning banks	Square yards	49,000			No bid.
Do	do	7RG-1921	Daugherty Lateral, schedule 1, cleaning	Cubic yards	847	.29		.29
Do	do	8RG-1921	Bovee Lateral, schedule 1, cleaning	do	788	.28		.28
Do	do	9RG-1921	Jornado Lateral, schedule 1, cleaning	do	2,456	.28	.30	.28
Do	do	10RG-1921	Green Lateral, schedule 1, cleaning	do	1,301	.24		.24
Do	do	11RG-1921	Rodriguena Lateral:					
			Schedule 1, cleaning	do	771	.23	.30	.23
			Schedule 2. cleaning banks	Square yards	16,200	.25-.54		.25-.54
Do	do	12RG-1921	Upper Clint Lateral:					
			Schedule 1, cleaning	Cubic yards	2,020	.24		.24
			Schedule 2, cleaning banks	Square yards	6,800			No bid.
Do	Dec. 22, 1920	13RG-1921	Canutillo Canal:					
			Schedules 1 and 2, reconstruction	Cubic yards	12,009	.245	.28	.245
			Schedule 3, reconstruction	do	5,968	.28	.29	.28
			Schedule 4, reconstruction	do	5,159	.27	.28	.27
			Schedule 5, reconstruction	do	5,896	.24	.28	.24
			Schedule 6, reconstruction	do	4,347	.22	.26	.22
			Schedules 7 and 8, reconstruction	do	11,389	.29		Rejected
			Schedule 9, reconstruction	do	5,555	.28	.29	.28
			Schedules 10, 11, and 12, reconstruction	do	10,515	.25	.29	.25
Do	Dec. 27, 1920	14RG-1921	Cuadrilla Lateral, schedule 1, cleaning	do	1,341	.26		.26
Do	do	15RG-1921	Wadlington Lateral, schedule 1, cleaning	do	2,279	.24	.27	.24
Do	do	16RG-1921	Canas Agrias Lateral, schedule 1, cleaning	do	630	.30		.30
Do	Dec. 31, 1920	17RG-1921	Canutillo Canal:					
			Schedule 7, reconstruction	do	5,389	.25	.29	.25
			Schedule 8, reconstruction	do	6,000	.25	.275	.25
			Canutillo Canal, waste-water, schedule 13, reconstruction.	do	1,568	.23		.23
Do	Jan. 8, 1921	18RG-1921	Las Cruces Lateral and Armijo Branch, schedules 1 to 9, reconstruction.	do	51,476			Canceled.
Do	Jan. 10, 1921	19RG-1921	Las Cruces Lateral, schedules 1 and 2, cleaning.	do	8,626	.27		.27
Do	do	20RG-1921	Mesilla Lateral, schedule 1, cleaning	do	7,740	.24	.26	.24
Do	do	21RG-1921	Chamberino Lateral, schedule 1, cleaning	do	3,225	.26		.26
Do	do	22RG-1921	San Miguel Lateral, schedule 1, cleaning	do	5,855	.285		.285
Do	do	23RG-1921	American Bend, Lateral, schedule 1, cleaning	do	1,627	.23	.25	.23
Do	do	24RG-1921	Tortugas Lateral, schedule 1, cleaning	do	1,156	.28	.29	.28

[1] No bid; work done by Government forces.

Unit bids and contract prices on formal specifications—Continued.

EARTHWORK—Continued.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
New Mexico-Texas, Rio Grande	Jan. 10, 1921	25RG-1921	Picacho Branch Canal, schedule 1, cleaning	Cubic yards	1,801	$0.23	$0.25	$0.23
Do	do	26RG-1921	Dona Ana Lateral:					
			Schedule 1, cleaning	do	5,040	.18	.225	.18
			Schedule 2, cleaning	do	5,044	.19	.22	.19
			Schedule 3, cleaning	do	5,167	.21	.235	.21
Do	do	27RG-1921	Three Saints Lateral, schedule 1, cleaning	do	3,777	.25	.28	.25
Do	do	28RG-1921	Barrio Lateral, schedule 1, cleaning	do	3,864	.25		.25
Do	do	29RG-1921	Laguna Lateral, schedule 1, cleaning	do	3,208	.24	.28	.24
Do	do	30RG-1921	Louisiana Lateral, schedule 1, cleaning	do	2,840	.26		.26
Do	do	31RG-1921	Quesenberry Lateral, schedule 1, cleaning	do	2,197	.28		.28
Do	do	32RG-1921	Berino Lateral, schedule 1, cleaning	do	568	.30	.32	.30
Do	do	33RG-1921	La Union East Lateral:					
			Schedules 1 and 2, cleaning	do	8,894	.2275	.23	.2275
			Schedule 3, cleaning	do	4,561	.2275	.25	.2275
Do	Jan. 22, 1921	34RG-1921	La Union East Canal:					
			Schedule 1, cleaning	do	4,500	.17	.18	.17
			Schedule 2, cleaning	do	4,500	.18	.19	.18
			Schedule 3, cleaning	do	4,500	.17	.20	.17
Do	Jan. 27, 1921	35RG-1921	Las Cruces Canal, schedule 1, cleaning banks	Miles	3.40			No bid.
			Mesilla Canal, schedule 2, cleaning banks	do	8.60	40.00	60.00	40.00
			Houghton Lateral, schedule 3, cleaning banks.	do	2.23			No bid.
			Laguna Lateral, schedule 4, cleaning banks	do	2.81	40.00	45.00	40.00
			California Lateral, schedule 5, cleaning banks.	do	3.26	35.00		35.00
			Three Saints Lateral, schedules 6 and 7, cleaning banks.	do	10.28	35.00		35.00
			San Jose Lateral, schedule 8, cleaning banks.	do	3.28	35.00		35.00
			East Side Canal:					
			Schedule 9, cleaning banks	do	6.63	100.00		Rejected.
			Schedule 10, cleaning banks	do	6.62			No bid.
			San Miguel Lateral, schedule 11, cleaning banks.	do	4.26	40.00	50.00	40.00
			Chamberino Lateral, schedule 12, cleaning banks.	do	7.29	42.00	45.00	42.00
			Chamberino East Lateral, schedule 13, cleaning banks.	do	6.31			No bid.
			La Union West Lateral, schedules 14 and 15, cleaning banks.	do	10.14	29.00	30.00	29.00

			Little La Union Lateral, schedule 16, cleaning banks.	do	4.05	24.00	30.00	24.00
			Brazito Middle Lateral, schedule 17, cleaning banks.	do	1.89	30.00	39.00	30.00
			Brazito East Lateral, schedule 18, cleaning banks.	do	1.04	30.00	39.00	30.00
			Leasburg Canal:					
			Schedule 19, cleaning banks	do	5.41	49.00	50.00	49.00
			Schedule 20, cleaning banks	do	5.42	39.00	40.00	39.00
Do	Feb. 12, 1921	36RG-1921	Louisiana Lateral Extension, schedule 1	Cubic yards	3,585	.25	.28	.25
			Lester Lateral, schedule 2	do	4,585	.20	.25	.20
EXCAVATING EQUIPMENT.								
Arizona, Yuma	June 24, 1920	226-D	Drag-line excavator limiting weight to 17 to 19 tons.	Each	1			$10,630.00
Arizona, Yuma Auxiliary	do	227-D	Drag-line excavator limiting weight 28 to 31 tons.	do	1			18,850.00
Nevada, Newlands	do	226-D	Drag-line excavator	do	1	$9,400		9,400.00
Do	do	227-D	do	do	1	17,170		17,170.00
Do		229-D	Drag-line excavator (2 class 14 Bucyrus)	do	2	53,868		107,736.00
Do	Nov. 10, 1920		Lighting sets for drag-line excavators	do	2	349		698.00
			do	do	2	506		1,012.00
EXCAVATION, CLASS 1.								
Idaho, Boise	Aug. 24, 1920		Notus Canal:					
			Schedule 1	Cubic yards	19,000	$0.27	$0.28	$0.35
			Schedule 2	do	28,000	.24	.27	.24
			Schedule 3	do	25.500	.24	.27	.24
			Schedule 4	do	24.500	.27	.28	.27
			Schedule 5	do	30,500	.26	.27	.26
			Schedule 6	do	23,500	.26	.27	.26
			Schedule 7	do	23,500	.27	.28	.28
			Schedule 8	do	24,500	.27	.28	.30
			Schedule 9	do	4,000	.27	.28	.40
Do	Nov. 23, 1920		Notus Canal, laterals:					
			Schedule 1	do	1,800	.14	.195	.14
			Schedule 2	do	1,850	.14	.195	.14
			Schedule 3	do	1,500	.14	.19	14
			Schedule 4	do	1,900	.14	.195	.14
			Schedule 5	do	1,500	.14	.19	.14
			Schedule 6	do	1,700	.14	.195	.14
			Schedule 7	do	2,500	.14	.195	.14
			Schedule 8	do	1,600	.14	.195	.14
			Schedule 9	do	1,400	.10	.195	.10
			Schedule 10	do	2,000	.10	.195	.10
			Schedule 11	do	2,000	.10	.15	.10
			Schedule 12	do	1,200	.10	.15	.10

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 1—Continued.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Idaho, King Hill	Oct. 29, 1920		Main Canal:					
			Schedule 2	Cubic yards	420	$0.30		$0.30
			Schedule 3	do	360	.40		.40
Montana, Sun River	Mar. 1, 1921	Advertisement No. 2005.	Lateral excavation:					
			Schedule 1	do	1,050	.20	$0.25	.20
			Schedule 2	do	2,400	.20	.28	.20
Do	Apr. 14, 1921	395	Lateral excavation:					
			Schedule 1	do	12,500	.17	.19	.17
			Schedule 2	do	11,000	.17	.18	.17
			Schedule 3	do	7,800	.20	.21	.20
			Schedule 4	do	12,400	.195	.22	.195
			Structural excavation, schedule 5	do	3,200	.27	1.00	1.00
Nevada, Newlands	Aug. 25, 1920	6	Gault Lateral:					
			Schedule 1	do	5,503	.16	.17	880.48
			Schedule 2	do	5,663.9	.16	.17	906.22
			Schedule 3	do	5,322.5	.15	.16	798.38
Do	Nov. 3, 1920	7	Rabjohn Lateral, schedule 1	do	2,814.8	.14	.145	394.07
Do	Mar. 3, 1921	8	Dalton Lateral:					
			Schedule 1	do	2,190	.14	.16	306.60
			Schedule 2	do	2,242.2	.12	[2] .10	269.06
			Schedule 3	do	2,023.6	.13	.18	263.07
Do	Mar. 17, 1921	9	Hardy Lateral, schedule 1	do	953	.17	.20	162.01
Do	do	9	Thompson Lateral, schedule 2	do	1,329	.15	.20	199.35
Do	do	9	Lattin Lateral, schedule 3	do	566	.15	.17	84.90
Do	do	9	Wiggins Lateral, schedule 4	do	921.3	.11	.20	101.34
Do	Apr. 23, 1921	10	Harding Lateral:					
			Schedule 1	do	1,881.3	.07	.10	131.69
			Schedule 2	do	1,783.4	.07	.10	124.84
Do	May 7, 1921	11	"J" Lateral, schedule 1	do	1,525.6	.14	.15	213.58
Do	do	11	Pierson waste, water ditch, schedule 2	do	1,453.3	.10	.12	145.33
Do	June 16, 1921	12	Lisle Lateral:					
			Schedule 1	do	1,895	.15	.18	284.25
			Schedule 2 [3]	do	1,811.5	.19	.23	
South Dakota, Belle Fourche	Mar. 29, 1921	393	Willow Creek Lateral extension, schedules 1, 2, and 3.	do	198,000	.23	.249	.23

EXCAVATION, CLASS 2.

Idaho, Boise	Aug. 24, 1920		Notus Canal:					
			Schedule 1	Cubic yards	7,300	$0.75	$0.90	$0.90
			Schedule 2	do	200	.75	.84	.75
			Schedule 3	do	200	.75	.84	.75
			Schedule 4	do	900	.75	.84	1.00
			Schedule 5	do	1,000	.75	.90	.75
			Schedule 6	do	800	.75	.90	.75
			Schedule 7	do	800	.75	.90	.75
			Schedule 8	do	800	.75	.90	1.00
			Schedule 9	do	1,400	.75	.90	.90
Idaho, King Hill	Oct. 29, 1920		Main Canal:					
			Schedule 2	do	560	1.20		1.20
			Schedule 3	do	240	1.35		1.35
Montana, Milk River	May 26, 1921	M. R. P. 32.	NR South Canal, Lateral N-N-o, schedule 1.	do	10	.50	1.00	.50
Montana, Sun River	Mar. 1, 1921	Advertisement No. 2005.	Lateral excavation:					
			Schedule 1	do	10	.30	.40	.45
			Schedule 2	do	100	.35	.50	.90
Do		395	Lateral excavation:					
			Schedule 1	do	100	.20	.30	.20
			Schedule 2	do	100	.20	.30	.20
			Schedule 3	do	200	.45	.50	.50
			Schedule 4	do	200	.45	.60	.45
			Structural excavation, schedule 5	do	100	.70	1.25	1.50
South Dakota, Belle Fourche	Mar. 29, 1921	393	Willow Creek Lateral extension, schedules 1, 2, and 3.	do	1,500	.50	.60	.60

EXCAVATION, CLASS 3.

Idaho, Boise	Aug. 24, 1920		Notus Canal:					
			Schedule 1	Cubic yards	10,300	$1.90	$2.35	$1.90
			Schedule 9	do	1,600	1.90	2.35	1.90
Idaho, King Hill	Oct. 29, 1920		Main Canal:					
			Schedule 2	do	420	2.65		2.65
			Schedule 3	do	200	2.65		2.65
Montana, Milk River			NR South Canal, Lateral NN-O, schedule 3	do	10	.80	1.00	.80
Montana, Sun River	Mar. 1, 1921	Advertisement No. 2005.	Lateral excavation:					
			Schedule 1	do	5	.35	.50	.55
			Schedule 2	do	5	.40	.60	.95
Do	Apr. 14, 1921	395	Lateral excavation:					
			Schedule 1	do	10	.20	.40	.20
			Schedule 2	do	10	.20	.40	.20
			Schedule 3	do	10	.50	.60	.50
			Schedule 4	do	10	.60	1.00	.60
			Structural excavation, schedule 5	do	5	1.50	2.00	2.00
South Dakota, Belle Fourche	Mar. 29, 1921	393	Willow Creek Lateral extension, schedules 1, 2, and 3.	do	150	1.00	1.50	1.00

[2] Bidder entered proposals for schedules 1 and 2 for selection of one schedule. Was awarded schedule 1.

[3] All bids rejected on schedule 2.

Unit bids and contract prices on formal specifications—Continued.

GATES AND EQUIPMENT.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Idaho, King Hill	Aug. 27, 1920	233-D	4 by 3 foot cast-iron gate	Each	1	$165.00		$165.00
			5 by 4 foot cast-iron gate	do	1	252.00		252.00
			4 by 4 foot cast-iron gate	do	4	207.00		828.00
			30-inch handwheel hoist	do	1	196.00		196.00
			4:1 geared hoist	do	1	155.00		155.00
			6:1 geared hoist	do	4	245.00		980.00
			Stem guides	do	4	4.50		18.00
Nevada, Newlands	Feb. 3, 1921		Wooden gate handwheel lifts; handwheel 15 inches diameter, complete with stems, etc.	do	42	7.35		309.00
Wyoming, Shoshone	Dec. 17, 1920	238-D	Variable head turbines	Job		[4] 24,950.00	$32,500.00	32,500.00
Do	Dec. 23, 1920	239-D	Electrical apparatus: 2 1,000 kilovolt-ampere generators; 2 3-phase transformers; 2 37½-kilovolt-ampere 3-phase transformers; Switching apparatus	do		[5] 42,704.00	44,758.00	44,758.00
		398-D	Riveted steel penstock: 42-inch pipe connections; 48-inch valve extensions; Miscellaneous; 60-inch S. S. tunnel lining; 96-inch S. S. tunnel lining	do		[6] 11,495.00	11,583.00	12,280.00
Do	Jan. 6, 1921	243-D	48-inch needle valves, item 1	do		[7] 9,100.00	10,500.00	13,070.00
Do	do	243-D	Gate valve, item 2	do		[8] 2,450.00	2,580.00	2,580.00
Do	May 2, 1921	250-D	Penstock connections and tunnel linings	do		6,759.00	6,900.00	6,759.00

MACHINERY.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
New Mexico-Texas, Rio Grande	June 24, 1920	226-D	P. & H. 206 drag lines	Job	2	$21,060.00		$21,060.00
Do	do	227-D	Bucyrus 30B drag line	do	1	18,850.00		18,850.00
Do	Jan. 20, 1921	245-D	Radial and weir grates and accessories, Franklin Canal headworks, schedules 1 and 3.	do	4	3,660.00		3,660.00
			Hoisting machinery, Franklin Canal headworks, schedule 2.	do		2,900.00		2,900.00
			Gate hoists, Franklin Canal headworks, schedule 4.	do	20	2,600.00		2,600.00
Do	Apr. 1, 1921	392	Pistons for balanced valves, Elephant Butte Dam.	do	2	4,100.00		4,100.00

OVERHAUL.

Montana, Milk River	June 1, 1921	M. R. P. 33	Dodson North Canal, Lateral DN-46	Cubic yard	400	$0.04	$0.04	$0.04

STRUCTURES.

Montana, Milk River	June 3, 1921	391	Nelson Reservoir enlargement:					
			Schedules 1, 2, 3, and 4	Cubic yards	110,500	$0.39	$0.40	$0.40
			Gravel blankets, schedules 1, 2, 3, and 4	do	53,900	.50	.60	.50
			Overhaul, schedules 1, 3, and 4	do	373,000	.02	.02	.02
			Schedule 2	do	340,000	.01½	.02	.01½
			Riprap, schedules 3 and 4	do	2,810	1.40	2.75	4.00
			Reinforced concrete, schedule 5	do	81	20.00	25.00	25.00
			Hauling and placing lumber	M. F. B. M.	1,000	10.00	25.00	10.00
			Placing metal work	Lump		100.00	160.00	160.00
Do	June 18, 1921	255-D	NR. South Canal laterals:					
			Schedule 1—					
			Excavation, class 1	Cubic yards	800	.30		.30
			Excavation, class 2	do	20	.40		.40
			Back fill	do	700	.30		.30
			Concrete	do	70	10.00		10.00
			Dry paving	Square yards	20	3.00		3.00
			Schedule 2—					
			Excavation, class 1	Cubic yards	250	.30		.30
			Excavation, class 2	do	50	.40		.40
			Back fill	do	400	.30		.30
			Puddled back fill	do	20	.50		.50
			Concrete	do	20	10.00		10.00
			Erecting lumber	M. F. B. M.	16	30.00		30.00
			Schedule 3—					
			Excavation, class 1	Cubic yards	500	.30		.30
			Excavation, class 2	do	20	.40		.40
			Wet excavation	do	150	.50		.50
			Back fill	do	350	.30		.30
			Puddled back fill	do	50	.50		.50
			Concrete	do	65	10.00		10.00
			Placing pipe and fittings	Lump	100	15.00		15.00

[4] Design of next to lowest bidder superior to that of lowest bidder.
[5] Generators furnished with lowest combined bid did not conform to the specifications.
[6] Lowest bidder proposed to sublet contract. Next to lowest bidder, the time of delivery was unsatisfactory.
[7] Designs of two lowest bidders unsatisfactory for this installation.
[8] Design of lowest bidder unsatisfactory.

Unit bids and contract prices on formal specifications—Continued.

STRUCTURES—Continued.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Milk River	Apr. 15, 1921	29	VS Laterals and NRS Laterals:					
			Schedule 1—					
			Excavation, class 1	Cubic yards	100	$0.35	$0.35	$0.35
			Excavation, class 2	do	20	.35	.90	.35
			Back fill	do	230	.35	.35	.35
			Concrete	do	13	13.00	14.00	13.00
			Dry paving	Square yards	20	1.50	3.00	4.00
			Erecting lumber	M feet b. m.	22	30.00	35.00	40.00
			Schedule 2—					
			Excavation, class 1	Cubic yards	1,800	.32	.35	.32
			Excavation, class 2	do	80	.32	.90	.32
			Back fill	do	70	.35	.35	.35
			Puddled back fill	do	50	.75	.75	.75
			Concrete	do	48	12.00	14.00	12.00
			Rubble concrete paving	Square yards	100	2.25	2.50	2.25
			Placing No. 72 metal flume	Linear foot	147	.15	.44	.15
			Erecting lumber	M feet b. m.	1.6	40.00	50.00	50.00
			Gravel foundation	Cubic yards	30	2.00	3.00	11.00
			Schedule 3—					
			Excavation, class 1	do	100	.35	.40	.35
			Excavation, class 2	do	20	.35	1.00	.35
			Back fill	do	75	.35	.40	35
			Puddled back fill	do	25	.75	3.00	.75
			Concrete	do	12	12.00	15.00	12.00
			Dry paving	Square yards	60	1.25	3.50	3.50
			Rubble concrete paving	do	30	2.00	10.00	2.00
			Placing No. 72 metal flume	Linear foot	80	.15	.50	.15
			Erecting lumber	M feet b. m.	1	50.00	50.00	50.00

ENGINEERING DATA FOR PROJECTS ON COMPLETION.

[The following tables of data for projects on completion, covering reservoirs, storage dams, diversion dams, canals, tunnels, and irrigable area, are necessarily subject to some revision as the projects develop and more detailed plans are prepared. In so far as they refer to works yet to be built or areas not yet covered by canal, they are not to be taken as guaranteeing that such work will ever be done. All future work depends on appropriations therefor by Congress.]

Engineering data for projects when completed.

RESERVOIRS.

Projects.	Name.	Area.	Capacity.	Spillways.			
				Length.	Elevation above stream bed.	Capacity.	
						Normal.	Maximum.
		Acres.	*Acre-feet.*	*Feet.*	*Feet.*	*Sec.-ft.*	*Sec.-ft.*
Arizona: Salt River	Roosevelt	16,832	1,305,000	420	225	.....	.....
California: Orland	East Park	1,850	51,000	415	88	8,000	12,000
Colorado: Uncompahgre	Taylor Park	2,260	106,000	(1)	(1)	(1)	(1)
Idaho:							
Boise	Deer Flat	9,835	177,000	None.	.....	.....	.....
Do	Arrowrock	2,860	280,000	402	247	15,000	40,000
Minidoka	Lake Walcott	11,350	[2] 150,000	2,385	42	40,000	60,000
Do	Jackson Lake	25,530	847,000	160	41	7,500	13,000
Montana:							
Milk River	St. Mary Lakes	6,910	124,000	500	20	[3] 500	20,000
Do	Sherburne Lakes	2,000	78,000	200	70	[3] 200	8,000
Do	Nelson Reservoir	4,876	70,000	(4)	[4] 23	.....	.....
Do	Point of Rocks	180	830	740	8	[3] 0	700
Do	Beaver Creek	5,800	50,000	238	39	[3] 100	15,000
Do	Chain Lakes	7,700	244,000	300	58	[3] 300	10,000
Sun River	Willow Creek	2,696	86,000	200	100	725	(1)
Do	Beaver Creek [5]	1,360	105,000	275	190	.....	42,500
Do	Pishkun Reservoir	1,542	45,700	Under	control.	.....	.....
Do	Muddy Creek	1,828	33,000	.....	80	284	(1)
Do	Benton Lake	9,300	144,000	Under	control.	.....	.....
Nebraska - Wyoming:							
North Platte	Pathfinder	22,700	1,070,000	605	184	40,000	.....
Do	Lake Alice	900	11,400	100	18	2,500	.....
Do	Lake Minatare	2,240	60,760	100	55	2,000	.....
Do	Winters Creek Lake	360	3,000	None.	.....	.....	.....
Do	Guernsey	2,336	72,700	300	80	27,500	50,000
Nevada: Newlands	Lake Tahoe	120,000	120,000	85	6	.....	.....
Do	Lahontan	12,000	290,000	500	112	.....	30,000
Do	Spanish Springs	17,700	300,000	60	96	.....	1,600
New Mexico: Carlsbad	Avalon	970	7,000	1,026	21	86,000	.....
Do	McMillan	7,860	45,000	1,750	26.1-24.9	17,000	34,500
New Mexico-Texas: Rio Grande.	Elephant Butte	40,080	2,638,000	275	193	8,000	16,000
Oregon: Umatilla	Cold Springs	1,500	50,000	330	90	6,000	6,000
Oregon-California: Klamath.	Upper Klamath Lake	60,000	264,000	None.	.....	.....	.....
Do	Clear Lake	25,000	462,000	357	24	10,000	30,000
South Dakota: Belle Fourche.	Belle Fourche	8,010	203,000	314	100	2,000	2,000
Do	Nine Mile	150	2,500	20	20	(1)	(1)
Utah: Strawberry Valley	Strawberry Valley	8,370	250,000	58	61	500	2,000
Washington:							
Okanogan	Salmon Lake	240	10,500	Siphon.	42	.....	400
Do	Conconully	460	13,000	180	55	4,500	16,000
Yakima	Bumping Lake	1,350	34,000	235	36	.....	6,000
Do	Lake Clealum	4,680	501,000	420	112	.....	18,000
Do	Lake Kachess	4,800	210,000	250	53	.....	7,200
Do	Tieton	1,800	202,500	420	213	.....	30,000
Do	Lake Keechelus	2,550	152,000	300	60	.....	10,000
Do	Clear Creek	126	1,700	210	35	.....	.....
Wyoming: Shoshone	Shoshone	6,600	456,600	300	233	11,000	30,000
Do	Ralston	200	2,100	.....	.....	.....	.....
Do	Deaver	80	680	None.	.....	.....	.....

[1] Undetermined.
[2] 95,180 acre-feet only available; above fixed crest of spillway.
[3] Average flow of stream on which reservoir is located.
[4] No spillways; drainage limited; elevation is that of water surface.
[5] Tentative.

Engineering data for projects when completed—Continued.

RESERVOIRS—Continued.

Projects.	Name.	Area.	Capacity.	Spillways.			
				Length.	Elevation above stream bed.	Capacity.	
						Normal.	Maximum.
INDIAN PROJECTS.							
Montana:		*Acres.*	*Acre-feet.*	*Feet.*	*Feet.*	*Sec.-ft.*	*Sec.-ft.*
Blackfeet	Two Medicine Lake	854	16,000	66	25½	[3] 350	6,000
Do	Spring Lake	1,400	29,000	50	45	0	900
Do	Four Horns	1,170	32,000	50	[4] 43	0	1,000
Do	Guardipee	1,110	22,600	170	[6] 40	0	840
Flathead	Dog Lake	160	3,200		[4] 30		
Do	Dry Fork	330	[7] 3,400	250	28	500	1,500
Do	Flathead Lake	120,000	1,800,000	1,000	180	100,000	150,000
Do	Horte	73	[8] 260	40	17	140	300
Do	Hubbart	400	15,000	50	120	400	1,200
Do	Kickinghorse	675	6,800		[4] 23		
Do	Little Bitterroot Lake	3,000	[8] 18,000		[4] 3		
Do	Lower Crow Creek	300	9,485	100	82	600	1,500
Do	McDonald Lake	220	[9] 10,600	200	51	4,000	6,000
Do	Mission	300	8,300	100	74	1,200	3,000
Do	Ninepipe	1,630	[10] 15,100		[4] 30		
Do	Pablo	2,100	[11] 29,600		[4] 36		
Do	Polson	70	1,700		[4] 80		
Do	Tabor	300	[12] 22,000	50	42	400	1,200
Do	Twin	70	937		[4] 25		
Fort Peck	Little Porcupine	390	3,900				
Do	Big Porcupine	400	3,800	[1] 100			
Do	Poplar River	3,700	50,000	(1)			
Do	Wolf Creek	350	4,550	(1)			
Do	Smoke Creek	300	5,300	(1)			
Total		607,073	13,441,502				

STORAGE DAMS.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
			Feet.	*Feet.*	*Cubic yds.*
Arizona: Salt River	Roosevelt [8]	Rubble masonry arch, gravity.	280	1,125	342,325
California: Orland	East Park [8]	Concrete arch, gravity	139	250	12,200
Colorado: Umcompahgre.	Taylor Park	Undetermined	(13)	(13)	(13)
Idaho:					
Boise	Upper Deer Flat [8]	Earth fill	70	4,000	1,190,275
Do	Lower Deer Flat [8]	do	40	7,200	1,207,606
Do	Deer Flat Forest [8]	do	16	950	22,500
Do	Arrowrock [8]	Rubble concrete arch, gravity.	349	1,100	585,130
Minidoka	Minidoka [8]	Rock fill, concrete core	86	937	242,500
Do	Jackson Lake [8]	Massive concrete gate section and earth fill.	67	4,450	345,400
Montana:					
Milk River	St. Marys Lake	Earth embankment	30	2,000	135,000
Do	Sherburne Lakes [14]	do	78	2,000	215,000
Do	Nelson Reservoir [15]	do	28	10,365	176,000
Do	Point of Rocks [8]	do	12.5	2,680	31,000
Do	Beaver Creek	do	49	6,000	658,000
Do	Connolly	do	68	2,910	1,795,600
Sun River	Willow Creek [16]	Earth fill	110	1,045	452,000
Do	Beaver Creek [5]	Masonry	205	820	195,000
Do	Pishkun	Earth fill	48	8,600	444,000
Do	Muddy Creek	do	90	800	440,000
Do	Benton Lake	do	40	240	12,000

[1] Undetermined.
[3] Average flow of stream on which reservoir is located.
[4] No spillways; drainage limited; elevation is that of water surface.
[5] Tentative.
[6] Elevation above outlet.
[7] Present capacity 2,000 acre-feet.
[8] Completed.
[9] Present capacity, 8,200 acre-feet.
[10] Present capacity, 5,500 acre-feet.
[11] Present capacity, 12,000 acre-feet.
[12] Present capacity, that of natural lake 12,300.
[13] Not designed.
[14] First development completed.
[15] Completed to height of 11 feet, with storage of 25,000 acre-feet.
[16] Completed to height of 70 feet.

Engineering data for projects when completed—Continued.

STORAGE DAMS—Continued.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
			Feet.	*Feet.*	*Cubic yds.*
Nebraska-Wyoming: North Platte.	Pathfinder [8]	Broken range masonry arch	218	432	60,210
Do	Pathfinder Dike [8]	Earth fill	40	1,650	152,000
Do	Dam No. 1 [8]	do	30	3,100	240,000
Do	Dam No. 1½ [8]	do	23	2,550	119,000
Do	Minatare [8]	do	65	3,700	570,000
Nevada: Newlands	Lake Tahoe [8]	Concrete sluiceway regulator.	14	109	425
Do	Lahontan [8]	Earth and gravel fill with concrete spillways.	124	1,400	770,000
Do	Spanish Springs	do	112	2,815	.....
New Mexico: Carlsbad	Avalon [8]	Earth and rock fill, concrete core.	50	1,380	168,773
Do	McMillan [8]	Earth and rock fill	55	2,070	150,744
New Mexico-Texas: Rio Grande.	Elephant Butte [8]	Rubble concrete, gravity	306	[17] 1,674	[18] 605,200
Do	Elephant Butte Dike [8]	Earth fill	42	1,900	164,650
Oregon: Umatilla	Cold Springs [8]	do	98	3,800	789,500
Oregon-California: Klamath.	Clear Lake [8]	Rock fill	33	790	56,600
South Dakota: Belle Fourche.	Belle Fourche [8]	Earth fill	115	6,200	1,600,000
Do	Nine Mile	do	28	1,400	50,800
Utah: Strawberry Valley.	Indian Creek Dike [8]	Earth fill, reinforced concrete	37	1,311	101,107
Do	Strawberry Dam [8]	Earth fill, reinforced concrete core wall.	72	488	108,415
Washington:					
Okanogan	Salmon Lake [19]	Earth embankment	40	1,260	185,000
Do	Conconully [20]	Hydraulic earth fill	64	1,000	336,000
Yakima	Bumping Lake [8]	Earth fill	45	3,425	247,700
Do	Lake Clealum	Earth and gravel fill	125	700	462,000
Do	Lake Kachess [8]	do	63	1,400	193,300
Do	Tieton	Earth and rock fill	220	900	1,806,000
Do	Lake Keechelus [8]	Earth and gravel fill	70	6,500	639,000
Do	Clear Creek [8]	Single concrete arch	84	404	4,100
Wyoming: Shoshone.	Shoshone [8]	Rubble concrete arch	328	200	78,576
Do	Ralston [8]	Earth fill	50	150	24,740
Do	Deaver	do	14	1,300	30,300
INDIAN PROJECTS.					
Montana:					
Blackfeet	Two Medicine [21]	Earth embankment	36	900	28,600
Do	Spring Lake	do	50	1,500	75,000
Do	Four Horns [22]	do	53	1,150	32,000
Do	Guardipee	do	50	613	45,000
Flathead	Dog Lake	Loose rock and earth	35	2,250	67,000
Do	Dry Fork [23]	Earth	33	3,250	118,500
Do	Newell [24]	Concrete	170	850	100,000
Do	Horte [8]	Earth fill	16	930	3,800
Do	Hubbart	Loose rock and earth	118	450	302,000
Do	Kickinghorse	Earth	31	3,700	181,000
Do	Little Bitterroot [8]	do	10	300	4,000
Do	Lower Crow Creek	do	92	860	330,000
Do	McDonald Lake [19]	Loose rock and earth	57	1,500	214,000
Do	Mission	do	80	2,500	346,000
Do	Ninepipe [25]	Earth	38	2,180	162,000
Do	Pablo [26]	do	46	14,000	1,028,000
Do	Polson	do	85	1,100	170,000
Do	Tabor	Loose rock and earth	58	2,200	140,000
Do	Twin	Earth	30	1,600	46,000
Fort Peck	Little Porcupine [8]	Earth fill	17	4,200	43,400
Do	Big Porcupine	do	30	1,500	118,000
Do	Poplar River	do	51	5,200	1,500,000
Do	Wolf Creek	do	36	.....	85,300
Do	Smoke Creek	do	48	.....	76,000
Total					23,440,276

[8] Completed.
[17] Including spillway.
[18] Including spillway, 611,000 cubic yards.
[19] Under construction.
[20] Enlargement under construction.
[21] Completed, except automatic crest.
[22] First development, 16,000; completed for 4,000 acre-feet.
[23] First development completed; 114,000 cubic yards.
[24] First development completed; 83,500 cubic yards.
[25] First development, 64,191; completed for 5,000 acre-feet.
[26] First development, 153,750; completed for 13,000 acre-feet.

Engineering data for projects when completed—Continued.

DIVERSION DAMS.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume
			Feet.	*Feet.*	*Cubic yds.*
Arizona: Salt River	Granite Reef [8]	Rubble concrete weir	38	1,000	40,000
Do	Power Canal [8]	do	12¾	400	4,800
Do	Joint Head [8]	Concrete weir	10	600	1,740
Arizona - California: Yuma.	Laguna [8]	Indian weir, concrete and rock fill.[27]	10	4,780	441,732
California: Orland	South Canal [8]	Concrete on piling, with rock fill.	20	900	2,886
Do	North side [8]	Concrete weir, with removable timber crest.	8	360	270
Do	East Park Feed Canal.[8]	Concrete arch	44	154	1,777
Colorado:					
Grand Valley	Grand River Diversion.[8]	Masonry ogee weir with roller crest 10 to 15 feet high.	24	546	25,682
Uncompahgree	Gunnison [8]	Crib on rock fill and movable flashboards.	15¾	237	3,200
Do	Montrose and Delta [8]	Movable flashboard weir	6.8	68½	.....
Do	Loutsenhizer [8]	Pile and timber weir	.....	100	.....
Do	Selig [8]	Movable flashboard weir	6	95½	.....
Do	Ironstone [8]	Pile foundation with deck and needle flashboards.	8½	58½	.....
Do	East Canal [8]	Movable flashboard weir	(28)	144	.....
Do	Garnet [8]	Rubble concrete	.....	.....	.....
Idaho:					
Boise	Boise River [8]	Rubble concrete weir	45	[29] 246	21,750
Minidoka	Minidoka [8]	Combined diversion and storage dam. (See Storage.)	.....	.....	.....
Montana:					
Milk River	Swift Current [8]	Earth and timber crib	13	2,800	86,700
Do	St. Mary [8]	Concrete	6.5	198	480
Do	Chinook [30]	.....	.....	.....	.....
Do	Dodson [8]	Timber crib, rock filled	25	319	12,000
Do	Vandalia [8]	Reinforced concrete	34	1,500	11,000
Sun River	Sun River [8]	Concrete masonry	132	212	6,200
Do	Deep Creek	Reinforced concrete	12	100	500
Montana-North Dakota: Lower Yellowstone.	Lower Yellowstone [8]	Rock-filled, timber weir	12	700	14,500
Nebraska-Wyoming: North Platte.	Whalen [8]	Concrete weir	29	300	80,740
Nevada: Newlands	Truckee River [8]	16 concrete sluiceways	22	171	3,322
Do	Carson River [8]	23 concrete sluiceways	21	210	2,707
New Mexico: Carlsbad.	Avalon [8]	Combined storage and diversion. (See Storage.)	.....	.....	.....
New Mexico-Texas: Rio Grande.	Leasburg [8]	Rubble concrete weir	10.8	600	2,413
Do	Mesilla [8]	do	16.7	303	2,876
Do	Mexican [31]	Rubble masonry	4.7	320	.....
Do	Percha [8]	Rubble concrete	17	350	4,346
Oregon: Umatilla	Feed Canal (Echo) [8]	Concrete weir on timber crib	2½	400	296
Do	Maxwell Canal [8]	do	2.3	175	43
Do	Three-Mile Falls [8]	Concrete multiple arch	21	800	4,160
Oregon-California: Klamath.	Lost River [8]	Hollow reinforced concrete	40	290	5,550
Do	Lower Lost River [19]	Reinforced concrete	15	204	625
South Dakota: Belle Fourche.	Diversion [8]	Concrete weir	23	400	12,149
Utah: Strawberry Valley.	Spanish Fork [8]	do	16	70	1,262
Do	Indian Creek Crossing [8]	Earth	17	1,390	15,183
Do	Horse Creek Crossing [8]	do	6	500	7,376
Do	Diverting dam at Strawberry Dam.[8]	do	6	100	1,146
Do	Diverting dam at rating flume.[8]	do	12	150	4,103
Washington:					
Okanogan	Salmon Creek [8]	Concrete weir	4½	50	132
Yakima	Sunnyside [8]	Concrete ogee weir	8½	500	2,291
Do	Tieton Diversion [8]	Concrete and rock-filled crib	3	110	334
Wyoming: Shoshone.	Corbett [8]	Reinforced-concrete weir	18	400	4,951

[8] Completed.
[19] Under construction.
[27] Maximum height 40 feet from bottom of sheet piling to top of dam: water raised 10 feet.
[28] Two weirs, one 6 feet by 72 feet, the other 6 feet 10 inches by 72 feet.
[29] Length, including logway.
[30] Will be constructed by irrigation districts. No data available as to type and dimensions.
[31] Constructed by Mexican authorities and used jointly.

Engineering data for projects when completed—Continued.

DIVERSION DAMS—Continued.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
INDIAN PROJECTS.					
Montana:			*Feet.*	*Feet.*	*Cubic yds.*
Blackfeet	Two Medicine	Brush and rock	4	165	175
Do	Blacktail [8]	Concrete	14	54	290
Do	Badger Birch and Cut Bank.	Not yet designed			
Flathead	Jocko River	Log crib, rock filled [13]			
Do	Little Bitterroot	do			
Do	Camas A [8]	Arched masonry	25	125	500
Do	Mud Creek [8]	Concrete	12	18	116
Do	Crow Creek [8]	do	13	82	330
Do	Post Creek—Kickinghorse [8]	Log crib, rock filled	7	110	1,500
Do	Post Creek—Pablo Feeder.	Concrete [13]			
Do	Mission Creek [8]—B Lateral.	Log apron	3	80	
Do	Dry Creek [8]	Log crib, rock filled [13]	10	20.67	115
Do	Finley Creek	do			
Do	Agency Creek	Concrete			
Do	Big Knife Creek [8]	do	5	6	25
Do	Valley Creek	Log crib, rock filled [13]			
Do	Other small creeks	do			
Fort Peck	Little Porcupine [8]	Concrete weir on timber crib.	4	150	250
Do	Poplar River [8]	do	4	300	180
Do	Big Porcupine [8]	do	6	150	185
Total					834,888

CANALS.

Projects.	Principal canals.			Mileage, with capacity in second-feet.				
	Name.	Maximum capacity.	Length.	Over 800.	300–800	50–300	Less than 50.	Total.
		Sec.-ft.	*Miles.*					
Arizona: Salt River	Power [8]	225	19					
Do	Arizona [8]	2,000	22	32	71	78	566	747
Do	South [8]	1,200	2					
Do	Consolidated [8]	1,000	7½					
Arizona-Calif.: Yuma	Main [8]	1,700	12					
Do	West Main	520	23	17	12	62	232	323
Do	East Main	880	24½					
California: Orland	East Park Feed [8]	250	7			7		7
Do	North Main [8]	80	4.5			8	32	40
Do	South Main [8]	225	9.1			23	75	98
Colorado:								
Grand Valley	Main [8]	1,425	62	5	39	21	232	297
Uncompahgre	South [8]	1,300	11.5	11.5			43	54.5
Do	West [8]	120	22			12.4	24.3	36.7
Do	Montrose and Delta [8]	450	32		14.9	37.1	47.6	99.6
Do	Loutsenhizer [8]	125	15			12.3	10.9	23.2
Do	Selig [8]	300	20		3.5	20.2	54.7	78.4
Do	Ironstone [8]	350	18		6	22.5	54.5	83
Do	East [8]	325	11		3.4	14.9	39.8	58.1
Do	Garnet [8]	50	10			7.3	4.2	11.5
Idaho:								
Boise	Main South [8]	2,500	34					
Do	Mora [8]	915	56	40	57	165	788	1,050
Do	Deer Flat, Low Line [8]	780	37					
King Hill	Main	315	48.4		6.5	35	6.9	48.4
Do	Lateral system		34.8				34.8	34.8
Minidoka	North Side [8]	1,500	8	25	30	95	483	633
Do	South Side [8]	1,000	13					
Montana:								
Huntley	Main	500	32		10	22	200	232
Do	Pumping High Line [8]	100	12					
Milk River	St. Mary [32]	850	29	29				29
Do	Dodson South [8]	900	43	43		66	130	239
Do	Dodson North [8]	200	29			23	37	60

[8] Completed. [13] Not designed. [32] Completed to 440 second-feet capacity

Engineering data for projects when completed—Continued.

CANALS—Continued.

Projects.	Principal canals.			Mileage, with capacity in second-feet.				
	Name.	Maximum capacity.	Length.	Over 800.	300-800	50-300	Less than 50.	Total.
Montana—Continued.		*Sec.-ft.*	*Miles.*					
Milk River	Vandalia [8]	300	48	.....	.....	45	41	86
Do	Nelson Reservoir [8]	260	27	.....	.....	27	59	86
Do	Chinook North	560	46	.....	14	29	3	[33] 46
Do	Chinook South	200	18	.....	.....	14	4	[33] 18
Sun River	Fort Shaw [8]	175	12	.....	.....	18	103	121
Do	Pishkun [34]	2,500	12	12	.....	.....	.....	12
Do	Sun River Slope [35]	1,000	25.4	25.4	.....	74	292	410.3
Do	Greenfields [35]	850	18.9	10.9	8			
Do	Other units	.....	.....	.....	50	54	210	314
Montana-North Dakota: Lower Yellowstone-	Main [8]	830	66	.....	49	19	190	258
Nebraska-Wyoming: North Platte.	Interstate [8]	1,400	95	90	20	92	603	805
Do	Fort Laramie [8]	1,430	127	.....	42	44	[36] 600	686
Nevada: Newlands	Truckee [8]	1,200	30					
Do	V Line [8]	1,500	8					
Do	L Line [8]	1,210	14.5					
Do	S Line [8]	1,210	18.7	42	62	81.5	562.4	747.9
Do	D Line [8]	440	7					
Do	AA Line [8]	400	13.4					
Do	T Line [8]	400	9					
New Mexico: Carlsbad	Main [8]	450	[37] 3	.....	13	12	120	145
	Main canals.[38]							
New Mexico-Texas: Rio Grande.	Arrey	350	4.7					
Do	Garfield	330	9.3					
Do	Hatch	200	8					
Do	Rincon	100	7					
Do	Leasburg and Extension.	480	13.6					
Do	Picacho Branch	90	3.7	.....	58.7	68.9	.....	127.6
Do	East Side	240	10.3					
Do	West Side and Extension.	490	28.4					
Do	Franklin	350	31.4					
Do	Franklin Feeder	350	5.1					
Do	Island Feeder	160	2.1					
Do	Tornillo	130	4					
	Main laterals.[39]							
Do	Dona Ana	50	9					
Do	Las Cruces	150	19					
Do	Mesilla	120	14					
Do	Picacho	60	7					
Do	Three Saints-Berino.	200	13					
Do	San Miguel	100	7					
Do	Chamberino	200	14					
Do	La Union	180	14					
Do	Montoya	60	6.5					
Do	Juan de Herrera	150	6.7	.....	.....	166.9	3.5	170.4
Do	Ysla	100	7.5					
Do	Salatral	90	11.5					
Do	Clint	50	7					
Do	South Side Feeder	220	3.2					
Do	Socorro	30	3.5					
Do	San Elizario	90	7.5					
Do	Island	160	13					
Do	Tornillo	100	7					

[8] Completed.
[33] Main canals only.
[34] Completed to first development capacity of 1,000 second-feet.
[35] Completed to first development capacity of 500 second-feet.
[36] Estimated.
[37] Main and southern canals, 31 miles.
[38] The greater part of these features is completed, there remaining for construction 2.5 miles of the Rincon Canal; 2 miles of the Leasburg Extension; 3 miles of reconstruction on the West Side Extension; reconstruction of Lower Franklin Canal; and the construction of Tornillo Heading and Canal; in addition some bank strengthening and lining will be necessary.
[39] Practically all partially or wholly constructed either as new laterals or acquire as community ditches; a very considerable amount of reconstruction, enlargement, and extension is yet to be done.

Engineering data for projects when completed—Continued.

CANALS—Continued.

Projects.	Principal canals.			Mileage, with capacity in second-feet.				
	Name.	Maximum capacity.	Length.	Over 800.	300-800	50-300	Less than 50.	Total.
		Sec.-ft.	*Miles.*					
Rio Grande—(contd)...	*Sublaterals.*[40]	.....	.....	.....	.....	.....	400	400
North Dakota: North Dakota Pumping.	Buford Trenton [8]...	60	6	.....	.....	6	39	45
Do.....	Williston [8].....	90	3	.....	.....	3	57	60
Oregon:								
Umatilla.....	Feed [8].....	350	25					
Do.....	West extension main	375	26.7	.....	33	52	90	175
Do.....	Maxwell.....	140	8					
Oregon-California:								
Klamath.....	A Canal [8].....	1,400	9					
Do.....	Keno [8].....	635	1					
Do.....	Lost River Diversion Channel.[8]	250	8					
Do.....	B Canal [8].....	260	4.5	10	12	54	165	241
Do.....	C Canal [8].....	1,050	13.2					
Do.....	D Canal [8].....	205	12					
Do.....	G Canal [8].....	190	9					
Do.....	C-G Canal [19].....	738	.8					
Do.....	J Canal [19].....	384	.5					
South Dakota: Belle Fourche.	Inlet [8].....	1,600	6½					
Do.....	North Side [8].....	700	45	7	43	133	502	685
Do.....	South Side [8].....	300	40					
Utah:								
Strawberry Valley..	Power [8].....	500	3.3	.....	3.3	.....	.....	3.3
Do.....	Trail Hollow [8].....	125	4	.....	.....	4	.....	4
Do.....	Indian Creek [8].....	750	2	.....	2	.....	.....	2
Do.....	High Line [8].....	300	17.5	.....	.....	17.5	.....	17.5
Do.....	Mapleton [8].....	100	6.75	.....	.....	6.75	.....	6.75
Do.....	Lateral 3 [8].....	30	2.2	.....	.....	.....	2.2	2.2
Do.....	Lateral 20 [8].....	55	6.1	.....	.....	1.1	5	6.1
Do.....	Lateral 30 [8].....	66	8.5	.....	.....	3.5	5	8.5
Do.....	Lateral 31 [8].....	10	.....	.....	.....	.....	.....	.....
Do.....	Lateral 32 [8].....	50	2.9	.....	.....	0.8	2.1	2.9
Do.....	Lateral 33 [8].....	150	2.2	.....	.....	2.2	.....	2.2
Do.....	Lateral 34 [8].....	55	11.1	.....	.....	1.3	9.8	11.1
Do.....	Miscellaneous laterals and sublaterals.	12	31.4	.....	.....	.....	31.4	31.4
Washington:								
Okanogan.....	Main [8].....	110	2	.....	.....	10	69	79
Yakima.....	Sunnyside Main [8]...	1,200	60	31	19	15	342	407
Do.....	Snipes Mountain [8]...	160	13	.....	.....	10	42	52
Do.....	Rocky Ford [8].....	100	13	.....	.....	1	29	30
Do.....	Mabton [8].....	110	14	.....	.....	8	44	52
Do.....	Benton Extension [8].	80	16	.....	.....	9	13	22
Do.....	Ticton [8].....	300	12	.....	12	32	291	335
Wyoming:								
Riverton.....	Wyoming.....	2,200	10	(13)	(13)	(13)	(13)	(13)
Shoshone.....	Garland [8].....	1,000	18	10.6	23.3	52.3	346.5	432.7
INDIAN PROJECTS.								
Montana:								
Blackfeet.....	Two Medicine.....	530	25					
Do.....	Fisher.....	500	30					
Do.....	Birch.....	45	6					
Do.....	Cutbank North.....	250	30	.....	55	144	600	799
Do.....	Cutbank South.....	300	20					
Do.....	Four Horns Supply.	275	12					
Flathead.....	Tabor Feeder.....	300	11					
Do.....	Pablo Feeder.....	300	45					
Do.....	Kickinghorse Feeder[8]	400	4	.....	14	82	800	896
Do.....	Ninepipe Feeder....	250	2					
Do.....	Pablo Lateral A [8]...	400	17					
Do.....	Camas A.....	150	10					
Fort Peck.....	Little Porcupine [8]...	250	1	.....	.....	1	13	14
Do.....	Poplar River B [8]....	100	29	.....	.....	11	22	33
Do.....	Poplar River C [8]....	100		.....	.....	18	48	66
Do.....	Big Porcupine [8].....	100	7	.....	.....	7	25	32
Do.....	Missouri Gravity....	625	100	.....	10	30	60	100
Do.....	Big Muddy M.....	250	21	.....	.....	14	7	21
Total.....	.....	.....	.....	441.4	796.6	2,206.45	9,946.6	13,391.05

[8] Completed.
[13] Not designed.
[19] Under construction.
[40] Sublaterals diverting from both main canals and main laterals; about half were acquired with community ditch systems and are being reconstructed and extended; with them approximately 100 miles of new ones are yet to be constructed for the irrigation of additional areas.

Engineering data for projects when completed—Continued.

TUNNELS.

Projects.	Name.	Length.	Capacity.
Arizona: Salt River	Power Canal: [8]	*Feet.*	*Second-feet.*
	Intake	1,695	225
	Lee	122	225
	Wehri Cut-off—		
	No. 1	428	225
	No. 2	129	225
	No. 3	271	225
	Wehri	151	225
	Pinto	999	225
	Chilton	1,027	225
	Robinson	152	225
	Gray	761	225
	Moffet	214	225
	Grapevine	872	225
	No. 6	206	225
	No. 7	312	225
	No. 8	553	225
	No. 9	320	225
	Power Canal: [8]		
	No. 10	489	225
	No. 11	625	225
	No. 12	70	225
	No. 13	110	225
	Roosevelt: [8]		
	Sluicing	480	225
	Outlet	167	225
	Penstock	620	225
Arizona-California: Yuma	Colorado River siphon [8]	930	1,400
Colorado:			
Grand Valley	Main Canal:		
	No. 1 [8]	3,723	1,425
	No. 2 [8]	1,655	1,425
	No. 3 [8]	7,292	670
Uncompahgre	Gunnison [8]	30,645	1,000
	South Canal: [8]		
	No. 1	482	1,300
	No. 2	395	1,300
	No. 3	1,000	1,300
	No. 4	400	1,300
	No. 5	390	1,300
	West Canal [8]	1,750	100
	West Canal Extension [8]	800	30
	Lower Selig Extension: [8]		
	No. 1	160	140
	No. 2	360	140
	No. 3	100	100
	No. 4	310	100
Idaho: Boise	Penitentiary	322	10
	Arrowrock Logway [41]	159	.....
Montana:			
Huntley	Main Canal:		
	No. 1 [8]	724	500
	No. 2 [8]	1,545	500
	No. 3 [8]	385	500
Sun River	Willow Creek [8]	639	725
	Sun River Storage	200	3,500
	Pishkun Canal:		
	No. 1 [34]	695	2,800
	No. 2 [34]	1,022	2,500
	No. 3 [34]	2,277	2,500
	Sun River Diversion Tunnel [8]	87	400
	Muddy Creek Reservoir	700	284
Nebraska-Wyoming: North Platte	Pathfinder:		
	North [8]	480	6,000
	South [8]	360	6,400
	Drainage [8]	155	([42])
	Auxiliary [8]	209	([42])
	Crosscut [8]	55	([42])
	Fort Laramie Canal:		
	No. 1 [8]	2,700	1,430
	No. 2 [8]	2,150	1,430
	No. 3	3,700	360

[8] Completed.
[34] Completed to first development capacity of 1,000 second-feet.
[41] Not intended to carry water, but for the purpose of running logs which are carried over the dam and brought down through a cableway chute which ends in this tunnel.
[42] Not designed for discharge.

Engineering data for projects when completed—Continued.

TUNNELS—Continued.

Projects.	Name.	Length.	Capacity.
		Feet.	*Second-feet.*
Nevada: Newlands	Truckee Canal:		
	No. 1 [8]	901	1,200
	No. 2 [8]	309	1,200
	No. 3 [8]	1,515	1,200
	Gilpin Spillway [8]	115	1,200
New Mexico: Carlsbad	Spillway:		
	No. 1 [8]	97	8,000
	No. 2 [8]	103	8,000
Oregon: Umatilla	Spillway from Feed Canal [8]	34	450
Oregon-California: Klamath	Main Canal [8]	3,300	1,200
South Dakota: Belle Fourche	South Canal [8]	1,306	350
Utah: Strawberry Valley	Strawberry [8]	19,897	600
	Strawberry Dam Sluicing [8]	532	600
	Power Canal:		
	No. 1 [8]	800	500
	No. 2 [8]	705	500
	Highline No. 1 [8]	227	300
Washington:			
Okanogan	Conconully outlet [8]	395	900
Yakima, Tieton	Steeple, No. 1 [8]	55	350
Yakima, Tieton	Steeple, No. 2 [8]	48	350
	Trail Creek [8]	3,120	300
	Columnar [8]	1,200	300
	Tieton [8]	2,729	300
	North Fork [8]	3,811	300
	Tieton Reservoir [8]	2,120	10,000
Wyoming: Shoshone	Shoshone: [8]		
	Lower outlet	498	6,000
	Spillway	405	30,000
	Upper outlet	315	.....
	Corbett [8]	17,355	1,000
	Ralston Reservoir [8, 43]	245	.....
	Frannie [8]	1,330	317
	Shoshone Road: [8]		
	No. 1	39	.....
	No. 2	45	.....
	No. 3	14	.....
	No. 4	28	.....
	No. 5	136	.....
	No. 6	166	.....
	Highline Canal:		
	No. 1	4,497	600
	No. 2	247	600
	No. 3	2,100	600
	No. 4	835	600
	No. 5	265	600
	No. 6	2,025	600
	No. 7	290	560
	No. 8	283	560
	No. 9	120	380
	No. 10	185	335
	Willwood:		
	No. 1	560	300
	No. 2	365	300
	Power Tunnel [8]	566	500
INDIAN PROJECTS.			
Montana:			
Flathead	Newell [44]	1,800	2,500
	Tabor Reservoir Outlet [8]	1,620	490
	Pablo 31A [8]	441	200
	Camas A	1,100	150
Fort Peck	Missouri	4,300	625
Total		165,253	.....

[8] Completed.
[43] Ralston Reservoir tunnel is a sluicing tunnel for the settling basin of Corbett Tunnel.
[44] 1,703 feet driven. Completed for first development (unlined).

IRRIGABLE AREA, PRESENT STATUS.

State, project, and division.	Public land.			State land unsold.	Indian land.	Private land.		Total.
	Entered.	Open.	Withdrawn.			Railroad, unsold.	Other.	
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Arizona:								
Salt River	16,170						196,830	213,000
Gravity system							183,077	183,077
Pumping system	16,170						13,753	29,923
Arizona-California: Yuma	18,070	276	33,284		8,200		50,170	110,000
Arizona—								
Yuma Valley	6,070		1,000				42,930	50,000
Yuma Mesa	5,800	276	31,884				7,040	45,000
California—Reservation	6,200		400		8,200		200	15,000
California:								
Orland							20,533	20,533
North Side							6,809	6,809
South Side							13,404	13,404
Vested water rights							320	320
Colorado:								
Grand Valley	13,478	367	12,310				18,845	45,000
Gravity system	10,948	367	8,280				15,405	35,000
Pumping system	2,530		4,030				3,440	10,000
Uncompahgre	21,684	1,634	993				75,689	100,000
South Canal system	2,566	474	9				6,327	9,376
West Canal system	2,518	17	14				4,025	6,574
Montrose and Delta Canal system	5,922	72	7				23,213	29,214
Loutzenhizer Canal system	253						6,451	6,704
Selig Canal system	4,721	564	863				7,420	13,568
Ironstone Canal system	1,325	115					16,721	18,161
East Canal system	4,371	392	100				8,861	13,724
Garnet Canal system	8						2,671	2,679
Idaho:								
Boise	67,468		3,160	1,859			257,316	[1] 329,803
King Hill	9,336	161		369			6,329	16,195
Minidoka	96,357	343		28			24,829	121,557
Montana:								
Huntley	26,464	942	1,535				3,944	32,885
First Division	23,859	942	708				3,106	28,615
Second Division	1,011						838	1,849
Third Division	1,594		827					2,421
Milk River	33,582		21,276	6,981	28,000		100,029	189,868
Chinook Division	3,500		2,800	1,538	28,000		50,905	86,743
Malta Division	23,069		17,143	4,325			33,308	77,845
Glasgow Division	7,013		1,333	1,118			15,816	25,280
Sun River	52,947	500	38,912	10,485		249	67,094	170,187
Fort Shaw	11,970		211	154		249	1,677	14,261
Sun River Slope	700		12,900	1,100			2,300	17,000
Beale				360			2,140	2,500
Greenfields Lake	2,040		2,490	640			960	6,130
Greenfields, Part One	9,867		2,911	831			12,377	25,986
Greenfields, future and Mill Coulee	20,570		20,400	5,000			5,340	51,310
Great Falls				200			7,800	8,000
Vaughn				500			9,500	10,000
Benton	7,800	500		1,700			25,000	35,000
Montana-North Dakota: Lower Yellowstone	15,091		2,079	747		97	41,515	59,529
Nebraska-Wyoming: North Platte	119,639		30,332	9,254			91,999	251,224
Interstate Division	82,360		411	529			45,924	129,224
Nebraska	79,749		411	529			28,939	109,628
Wyoming	2,611						16,985	19,596
Districts—								
North Platte Canal & Colonization Co							16,706	16,706
First lateral district	31,357		181	135			5,881	37,554
Second lateral district	22,255		83	354			12,997	35,689
Third lateral district	28,748		147	40			10,340	39,275
Fort Laramie Division	30,779		29,421	7,325			39,475	107,000
Nebraska	8,550		7,200	4,000			32,100	51,850
Wyoming	22,229		22,221	3,325			7,375	55,150
Northport Division, Nebraska	6,500		500	1,400			6,600	15,000
Nevada: Newlands	29,279	1,351	58,553		23,877	27,200	46,740	187,000
Carson Division	25,219	1,204	35,620		4,887	9,900	43,180	120,000
Truckee Division	4,060	147	1,933			12,300	3,560	22,000
Pyramid Division			6,000		[2] 19,000			25,000
Lovelock Division			15,000				5,000	20,000

[1] Including possible extensions.
[2] 3,000 acres to be allotted to about 600 Indians; remainder of land to be sold in accordance with act (33 Stat., 225).

IRRIGABLE AREA, PRESENT STATUS—continued.

State, project, and division.	Public land.			State land unsold.	Indian land.	Private land.		Total.
	Entered.	Open.	Withdrawn.			Railroad, unsold.	Other.	
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
New Mexico: Carlsbad	55						24,936	24,991
First							20,198	20,198
Second	55						4,164	4,219
Third							574	574
New Mexico-Texas: Rio Grande	550		1,650	2,490			145,310	150,000
New Mexico	550		1,650	2,490			81,310	86,000
Texas							64,000	64,000
Divisions—								
Rincon Valley			250	1,870			14,880	17,000
Leasburg	110		900	280			29,710	31,000
Mesilla	440		500	340			45,720	47,000
El Paso Valley							47,000	47,000
Tornillo District							8,000	8,000
North Dakota:								
North Dakota Pumping	513	351		1,029			23,817	25,710
Buford-Trenton	259	212		1,006			13,480	14,957
First Division	259	212		91			3,420	3,982
Extensions				14			1,361	1,375
Upper Bottom Division				501			2,099	2,600
Lower Bottom Division							4,000	4,000
Trenton Flat		400					2,600	3,000
Williston	254	139		23			10,337	10,753
First Division	254	139		23			7,237	7,653
West Bottom Division							1,900	1,900
East Bottom Division							1,200	1,200
Oregon: Umatilla	5,356	79	2,376			3,319	17,170	28,300
East Division—								
First	336					320	5,896	6,602
Second	499	44				78	3,517	4,138
Third	1,396					919	724	3,039
Fourth	349	35				90	1,001	1,475
Fifth	207						38	245
Sixth	140						979	1,119
West Division—								
First	808					399	1,092	2,299
Second	1,206					265	1,904	3,375
Third	365					92	1,527	1,984
Future			2,376			1,156	492	4,024
Oregon-California: Klamath	2,748		27,300				110,832	146,880
Oregon	2,286		4,300				101,636	108,222
California	462		23,000				9,196	32,658
Divisions—								
First	61						29,093	29,154
Second							7,205	7,205
Third	2,687						3,063	5,750
Marginal land (Tule)			27,300				241	27,541
Sand Hollow							13,500	13,500
Horsefly and Langell Valley							22,000	22,000
Pine Grove and Enterprise							3,730	3,730
Additional divisions							32,000	32,000
South Dakota: Belle Fourche	37,481	149	7,500	301			51,999	97,430
Utah: Strawberry Valley	1,953	38					52,009	54,000
High Line	1,953	[3] 38					20,722	22,713
Lake Shore							2,487	2,487
Mapleton							4,000	4,000
Power Canal							110	110
Santaquin							1,500	1,500
Spanish Fork Canyon							2,355	2,355
Spanish Fork							14,835	14,835
Springville							6,000	6,000
Washington:								
Okanogan	867						7,333	8,200
Yakima	4,675			404	241		134,280	139,600
Sunnyside Division	2,627			30	241		104,702	107,600
Tieton Division	2,048			374			29,578	32,000

[3] Consists of 2 small divisions.

IRRIGABLE AREA, PRESENT STATUS—continued.

State, project, and division.	Public land.			State land unsold.	Indian land.	Private land.		Total.
	Entered.	Open.	Withdrawn.			Railroad, unsold.	Other.	
Wyoming:	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Riverton			69,000		1,000		30,000	100,000
Shoshone	61,341	829	148,616	7,952		985	7,277	227,000
Garland Division—								
Part One	14,478						260	14,738
Part Two	13,625	69					1,266	14,960
Part Three	2,358	40		20			276	2,694
Part Four	5,986	252						6,238
Part Five	3,265			332				3,597
Part Six	952	149						1,101
Part Seven	55							55
Part Eight			271					271
Frannie Division—								
Part One	11,639	241		139			941	12,960
Part Two	4,391	78		237			22	4,728
Part Three	4,592					185		4,777
Part Four			3,567	384		732	362	5,045
Balance Garland and Frannie			10,378	640		68	350	11,436
Willwood Division			14,700	600			300	15,600
Heart Mountain Division			33,100	3,200			2,500	38,800
Oregon Basin [4]			86,600	2,400			1,000	90,000
INDIAN PROJECTS.								
Montana:								
Blackfeet					107,500			107,500
Cutbank North					9,000			9,000
Cutbank South					18,000			18,000
Two Medicine					44,000			44,000
Badger-Fisher					30,000			30,000
Piegan					3,000			3,000
Birch Creek					3,500			3,500
Flathead	38,100	42	4,908	4,800	[5] 71,600		5,050	124,500
Fort Peck	9,713	107		80	140,700		1,400	152,000
Little Porcupine					2,330		280	2,610
Poplar River					28,030		660	28,690
Big Porcupine					3,680		320	4,000
Big Muddy					18,890		40	18,930
Missouri River					77,770			77,770
Galpin Bottom Pumping	9,713	107		80			100	10,000
Milk River					10,000			10,000
Total, all projects	682,917	7,169	463,784	46,779	381,118	31,850	1,613,275	3,226,892
Per cent	21.2	0.2	14.4	1.4	11.8	1.0	50.0	100.0

[4] Unapproved.
[5] Allotments of deceased and incompetent Indians are sold at semiannual sales.

IRRIGABLE AND IRRIGATED AREAS, BY COUNTIES.

State and project.	County.	Total irrigable acreage.	Irrigated acreage, 1920.	Estimated irrigated acreage, 1921.	Estimated increase irrigated acreage.
Arizona: Salt River	Maricopa	[1] 213,000	205,060	207,000	1,940
Arizona-California: Yuma	Imperial, Calif.	15,000	11,400	11,000	.....
	Yuma, Ariz.	95,000	43,150	42,000	.....
		110,000	54,550	53,000	−1,550
California: Orland	Glenn	20,338	13,797	15,427	.....
	Tehama	195	73	73	.....
		20,533	13,870	15,500	1,630
Colorado:					
Grand Valley	Mesa	45,000	[2] 19,484	[2] 20,500	1,016
Uncompahgre	Montrose	76,000	48,776	51,300	.....
	Delta	24,000	15,404	16,200	.....
		100,000	64,180	67,500	3,320
Idaho:					
Boise	Ada	107,389	86,757	92,889	.....
	Canyon	215,461	165,969	181,778	.....
	Malheur, Oreg.	6,953	6,913	6,953	.....
		[3] 329,803	[4] 259,639	[4] 281,620	21,981
King Hill	Elmore	8,172	1,210	1,650	.....
	Owyhee	7,566	3,296	4,060	.....
	Twin Falls	457	274	290	.....
		16,195	4,780	6,000	1,220
Minidoka	Minidoka	65,394	55,480	56,000	.....
	Cassia	56,163	52,170	54,000	.....
		121,557	107,650	110,000	2,350
Montana:					
Huntley	Yellowstone	32,885	20,020	20,000	−20
Milk River	Blaine	86,743	23,000	23,000	.....
	Phillips	65,430	14,850	12,000	−2,850
	Valley	37,695	9,480	7,000	−2,482
		189,868	47,330	42,000	−5,330
Sun River	Cascade	78,333	8,033	8,030	.....
	Lewis and Clark	28	17	17	.....
	Teton	76,826	6,730	8,300	.....
	Choteau	15,000	.....	.....	.....
		170,187	14,780	16,347	1,567
Montana-North Dakota: Lower Yellowstone.	Dawson, Mont.	903	50	100	.....
	Richland, Mont.	38,305	14,710	14,000	.....
	McKenzie, N. Dak.	20,321	4,360	6,000	.....
		59,529	19,120	20,100	980
Nebraska-Wyoming: North Platte	Goshen, Wyo.	58,040	8,530	11,400	.....
	North Platte Canal & Colonization Co.	16,706	9,630	11,400	.....
	Scottsbluff, Nebr.	117,005	53,260	53,950	.....
	Sioux, Nebr.	31,717	25,050	24,000	.....
	Morrill, Nebr.	27,756	8,600	10,000	.....
		251,224	105,070	110,750	5,680

[1] 192,077 acres entitled to permanent water and 20,923 acres additional entitled to temporary water service.
[2] Including Palisade and Mesa County Irrigation Districts, 7,754 acres.
[3] Including possible extensions.
[4] Including vested water-right lands.

IRRIGABLE AND IRRIGATED AREAS, BY COUNTIES—continued.

State and project.	County.	Total irrigable acreage.	Irrigated acreage, 1920.	Estimated irrigated acreage, 1921.	Estimated increase irrigated acreage.
Nevada: Newlands	Churchill	156,950	42,230	44,560	2,329
	Lyon	4,890	3,250	3,300	50
	Washoe	25,000	.....	.....	.....
	Storey	160	130	140	10
		187,000	45,610	48,000	2,390
New Mexico: Carlsbad	Eddy	24,991	22,170	23,000	830
New Mexico-Texas: Rio Grande	Sierra, N. Mex	4,000	1,500	1,500	.....
	Dona Ana, N. Mex	82,000	48,760	48,760	.....
	El Paso, Tex	64,000	32,700	32,700	.....
		150,000	82,960	82,960	.....
North Dakota: North Dakota pumping	Williams	25,710	2,810	3,000	190
Oregon: Umatilla	Umatilla	17,571	8,770	9,041	272
	Morrow	10,729	3,260	3,459	200
		28,300	12,030	12,500	470
Oregon-California: Klamath	Klamath, Oreg	108,222	43,400	49,600	.....
	Siskiyou, Calif	18,500	300	300	.....
	Modoc, Calif	14,158	1,100	1,100	.....
		140,880	[5] 44,800	51,000	6,200
South Dakota: Belle Fourche	Butte	81,260	54,350	54,350	.....
	Meade	16,170	5,500	5,500	.....
		97,430	59,850	59,850	.....
Utah: Strawberry Valley	Utah	54,000	[6] 47,330	50,000	2,670
Washington:					
Okanogan	Okanogan	8,200	5,440	5,800	360
Yakima: Sunnyside	Yakima	83,733	76,045	71,000	.....
	Benton	23,867	17,565	22,000	.....
		107,600	93,610	93,000	−610
Tieton	Yakima	32,000	28,000	28,000	.....
Wyoming:					
Riverton	Fremont	100,000	.....	.....	.....
Shoshone	Carbon, Mont	92	.....	.....	.....
	Park, Wyo	140,908	38,150	38,500	.....
	Big Horn	86,000	7,500	8,000	.....
		[7] 227,000	45,650	46,500	850
INDIAN PROJECTS.					
Montana:					
Blackfeet	Glacier	77,500	4,610	7,500	.....
	Pondera	30,000	5,327	6,500	.....
		107,500	9,937	14,000	4,063
Flathead	Sanders	10,000	1,458	2,000	542
	Flathead	18,600	4,990	6,000	1,010
	Missoula	95,900	26,388	32,000	5,612
		124,500	32,836	40,000	7,164
Fort Peck	Valley	34,000	914	1,100	.....
	Roosevelt	114,000	654	600	.....
	Sheridan	4,000	.....	.....	.....
		152,000	1,568	1,700	133

[5] Includes 5,000 acres Van Brimmer lands, and 1,700 acres miscellaneous pumping divisions.
[6] Includes High Line, Spanish Fork, and Lake Shore Divisions and Mapleton and Springville Irrigation Districts.
[7] Includes unapproved Oregon Basin Division, 90,000 acres.

CROP STATISTICS.

Summary of crop reports on Government reclamation projects in 1920—areas (acres).

State and project.	Cereals.						Other grain and seed.						Hay and forage.							
	Barley.	Corn, Indian.	Oats.	Rye.	Wheat.	Total.	Alfalfa seed.	Clover seed.	Sorghum (grain).	Flaxseed.	Millet seed.	Total.	Alfalfa hay.	Clover hay.	Other hay.	Corn fodder.	Peas.	Other forage.	Pasture.	Total.
Arizona: Salt River	4,463	2,084	1,135	.....	3,363	11,045	.....	.....	5,597	.....	....	5,597	25,230	.....	.....	.....	....	1,245	8,732	35,207
Arizona-California: Yuma	130	.....	.....	.....	51	181	9,830	.....	2,300	.....	....	12,130	13,000	.....	142	84	....	.....	1,815	15,041
California: Orland	1,107	.....	.....	.....	80	1,187	.....	.....	1,582	.....	....	1,582	5,505	.....	924	.....	....	.....	3,720	10,149
Colorado:																				
Grand Valley	.....	710	1,470	.....	1,477	3,657	340	.....	.....	.....	....	340	3,140	.....	309	805	....	2,600	900	7,754
Uncompahgre	184	2,281	5,878	12	10,810	19,165	817	151	.....	.....	....	968	25,520	101	432	120	1	313	7,501	33,988
Idaho:																				
Boise	3,108	3,835	2,399	123	23,460	32,925	1,031	5,804	44	.....	9	6,888	45,974	7,731	54	278	....	.....	5,857	59,894
King Hill	67	106	151	.....	238	562	135	13	.....	.....	....	148	3,300	13	11	7	....	.....	190	3,521
Minidoka—																				
Gravity Division	1,102	799	3,463	132	7,644	13,140	484	1,245	.....	.....	....	1,729	28,568	846	202	194	....	9	5,054	34,873
Pumping Division	834	84	1,724	6	9,367	12,015	225	760	.....	.....	....	985	18,354	109	30	44	5	10	2,114	20,636
Montana:																				
Huntley	324	392	1,764	.....	5,098	7,578	12	142	.....	.....	....	154	7,468	54	.....	.....	....	.....	17,624	25,146
Milk River	89	63	1,058	85	2,799	4,094	35	.....	.....	575	....	610	4,031	.....	13,315	104	....	192	35	17,677
Sun River—																				
Fort Shaw Division	84	.....	501	.....	1,170	1,755	87	82	.....	77	....	246	5,193	67	187	.....	....	.....	718	6,165
Greenfields Division	153	.....	672	10	5,200	6,035	.....	.....	.....	735	....	735	382	8	382	.....	....	12	319	1,103
Montana-North Dakota: Lower Yellowstone	519	289	2,141	.....	6,042	8,991	15	.....	.....	671	....	686	7,030	.....	825	174	....	.....	416	8,445
Nebraska-Wyoming: North Platte—																				
North Platte Canal & Colonization Co. lands	96	1,480	870	102	265	2,813	.....	.....	.....	.....	....	.....	4,434	.....	.....	.....	....	.....	.....	4,434
Interstate Division	3,922	10,176	7,708	611	5,971	28,388	30	91	.....	.....	335	456	31,620	.....	528	31	....	.....	1,621	33,800
Fort Laramie Division	43	1,656	2,250	.....	2,050	5,999	.....	.....	.....	.....	....	.....	972	.....	286	46	....	.....	79	1,383
Nevada: Newlands	769	.....	68	.....	3,586	4,423	.....	.....	.....	.....	....	.....	30,794	.....	505	.....	....	.....	9,720	41,019
New Mexico: Carlsbad	.....	82	185	.....	136	403	1,500	.....	.....	.....	....	1,500	6,250	.....	.....	16	....	.....	280	6,546
New Mexico-Texas: Rio Grande	909	10,544	332	71	8,335	20,191	152	.....	268	.....	10	430	27,099	.....	785	498	114	.....	5,120	33,616
North Dakota: North Dakota Pumping	102	55	615	.....	330	1,102	.....	.....	.....	59	....	59	170	20	871	134	....	.....	263	1,458
Oregon: Umatilla	8	124	.....	10	20	162	34	.....	.....	.....	....	34	8,512	.....	335	100	....	.....	422	9,369
Oregon-California: Klamath	1,903	.....	2,449	1,185	2,736	8,273	.....	.....	.....	.....	....	.....	14,350	.....	2,622	.....	....	.....	9,750	2,722
South Dakota: Belle Fourche	1,695	3,272	4,864	.....	9,850	19,681	752	.....	.....	145	....	897	26,040	.....	2,820	308	....	.....	8,390	37,558
Utah: Strawberry Valley	353	115	1,462	59	8,440	10,429	9	70	5	.....	3	87	8,470	118	369	375	....	145	1,869	11,346

Summary of crop reports on Government reclamation projects in 1920—areas (acres)—Continued.

State and project.	Cereals.						Other grain and seed.						Hay and forage.							
	Barley.	Corn, Indian.	Oats.	Rye.	Wheat.	Total.	Alfalfa seed.	Clover seed.	Sorghum (grain.)	Flaxseed.	Millet seed.	Total.	Alfalfa hay.	Clover hay.	Other hay.	Corn fodder.	Peas.	Other forage.	Pasture.	Total.
Washington:																				
Okanogan													594		106	34			254	988
Yakima—																				
Sunnyside Division	716	5,110	359	91	4,153	10,429							45,545		1,690	422		403	5,808	53,868
Tieton Division	1,012	885	389		2,873	5,159							15,118		415	104		171	1,210	17,018
Wyoming:																				
Garland Division	175	15	3,114	14	7,385	10,703	34	1,385				1,419	17,140	55	117	18			2,508	19,838
Frannie Division	19	23	1,744	3	3,138	4,927	12	742			3	757	2,709	127	162	56			380	3,434
Total	23,886	44,180	48,765	2,514	136,067	255,412	15,534	10,485	9,796	2,262	360	38,437	432,512	9,249	28,424	3,952	120	5,100	102,669	582,026

State and project.	Vegetables and truck.						Fruits and nuts.							
	Beans.	Onions.	Potatoes, white.	Potatoes, sweet.	Truck.	Total.	Apples.	Peaches.	Pears.	Prunes.	Citrus fruit.	Small fruit.	Miscellaneous.	Total.
Arizona: Salt River	94		195		4,384	4,673					1,689	371	1,398	3,458
Arizona-California: Yuma					206	206							110	110
California: Orland					103	103				120	140	20	685	965
Colorado:														
Grand Valley			135		191	326	217		80					297
Uncompahgre	301	433	6,166		291	7,191	1,830	79	7	3		47		1,966
Idaho:														
Boise	45	46	4,386	99	590	5,166	1,319	98	19	458		145		2,039
King Hill			125		93	218	277		21			13		311
Minidoka—														
Gravity Division	29	36	1,917		656	2,638	139					20		159
Pumping Division	5	5	4,702		324	5,036	99					12		111
Montana:														
Huntley			78		180	258								
Milk River			88		15	103								
Sun River—														
Fort Shaw Division			164		52	216								
Greenfields Division			50		18	68								

Montana-North Dakota: Lower Yellowstone	44		174		107	325								
Nebraska-Wyoming: North Platte—														
North Platte Canal & Colonization Co. lands			972			972								
Interstate Division	86		5,800		330	6,216								
Fort Laramie Division	4		248		13	265								
Nevada: Newlands			354		650	1,004								
New Mexico: Carlsbad					17	17								
New Mexico-Texas: Rio Grande	615	131	9	365	4,923	6,043	510	47	576	9		177		1,319
North Dakota: North Dakota Pumping			110		55	165								
Oregon: Umatilla			48		143	191	652	50	7	2		30		741
Oregon-California: Klamath			201		64	265								
South Dakota: Belle Fourche			122		134	256								
Utah: Strawberry Valley	11		359	2	351	723	68	250				70		388
Washington:														
Okanogan			24		81	105	4,164	14	47	10		30		4,265
Yakima—														
Sunnyside Division		51	3,734		2,263	6,048	10,510	1,037	1,610	321		369		13,847
Tieton Division	38	61	812		310	1,221	7,134	590	1,737			220		9,681
Wyoming:														
Garland Division	10	4	1,104		262	1,380								
Frannie Division			67		59	126								
Total	1,282	767	32,144	466	16,865	51,524	26,919	2,165	4,104	923	1,829	1,524	2,193	39,657

State and project.	Miscellaneous.					Duplicated areas.	Total cropped.	Irrigated, no crop.					Total irrigated.
	Beets, sugar.	Cotton.	Cane.	Other.	Total.			Young alfalfa.	Young fruit.	Fall plowing.	Miscellaneous.	Duplicated.	
Arizona: Salt River		142,320			142,320	8,950	193,350				11,710		205,060
Arizona-California: Yuma		37,600	12		37,612	10,800	54,480				70		54,550
California: Orland				54	54	3,000	11,040	700	1,990		220	80	13,870
Colorado:													
Grand Valley	2,600			3,206	5,806	7,420	10,760	1,840	50	1,000	210	2,130	11,730
Uncompahgre	4,800			123	4,923	4,471	63,730	2,067	84	3,540	99	5,340	64,180
Idaho:													
Boise				88	88	6,300	100,700	6,110	194	1,509	1,258	11	109,760
King Hill						240	4,520	200	60				4,780
Minidoka—													
Gravity Division	3,943			32	3,975	874	55,640	3,697	379		2,856	1,052	61,520
Pumping Division	4,257				4,257	130	42,940	1,794	196		2,082	882	46,130
Montana:													
Huntley	2,330			104	2,434	15,550	20,020						20,020
Milk River			19		19	173	22,330	2,000					24,330

Summary of crop reports on Government reclamation projects in 1920—areas (acres)—Continued.

State and project.	Miscellaneous.					Duplicated areas.	Total cropped.	Irrigated, no crop.					Total irrigated.
	Beets, sugar.	Cotton.	Cane.	Other.	Total.			Young alfalfa.	Young fruit.	Fall plowing.	Miscellaneous.	Duplicated.	
Montana—Continued.													
Sun River—													
Fort Shaw Division				18	18		8,400				40		[1] 8,050
Greenfields Division				9	9		7,950				40		[2] 6,730
Montana-North Dakota: Lower Yellowstone	658			73	731	58	19,120						19,120
Nebraska-Wyoming: North Platte—													
North Platte Canal & Colonization Co. lands	1,115		36		1,151		9,370	674				414	9,630
Interstate Division	16,558		261	151	16,970		85,830	7,248			519	6,687	86,910
Fort Laramie Division	759		12	72	843		8,490	410			224	594	8,530
Nevada: Newlands						1,876	44,570				1,040		45,610
New Mexico: Carlsbad		26,300	64		26,364	14,650	20,180				1,990		22,170
New Mexico-Texas: Rio Grande		15,996	1,787	8	17,791	1,510	77,880				5,480	400	82,960
North Dakota: North Dakota Pumping				14	14	58	2,740	515			199	644	2,810
Oregon: Umatilla				33	33	340	10,190	1,523	104		350	137	12,030
Oregon-California: Klamath							35,260				2,840		38,100
South Dakota: Belle Fourche	1,103			355	1,458		59,850						59,850
Utah: Strawberry Valley	6,263		14		6,277		29,250				3,100		32,350
Washington:													
Okanogan						438	4,920		380		140		5,440
Yakima—													
Sunnyside Division	1,226			142	1,368	6,620	78,940	3,147	336		12,138	951	93,610
Tieton Division	18			313	331	6,160	27,250	880	950		500	1,580	28,000
Wyoming:													
Garland Division	1,504			6	1,510		34,850	1,040	40	70	60	870	35,190
Frannie Division	26				26		9,270	2,185	8	572	940	2,515	10,460
Total	47,160	222,216	2,205	4,801	276,382	89,618	1,153,820	36,030	4,771	6,691	48,105	24,287	1,223,480

[1] Figures for Fort Shaw Division, Sun River project, are for 203 farms, which included 390 acres cropped without irrigation.
[2] Figures for Greenfields Division, Sun River project, are for 151 farms, which included 1,260 acres cropped without irrigation.

Summary of crop reports on Government reclamation projects in 1920—Total yields.

State and project.	Cereals.						Other grain and seed.						Hay and forage.					
	Barley.	Corn, Indian.	Oats.	Rye.	Wheat.	Total.	Alfalfa seed.	Clover seed.	Sorghum (grain).	Flax seed.	Millet seed.	Total.	Alfalfa hay.	Clover hay.	Other hay.	Corn fodder.	Peas.	Other forage.
	Bush.	*Bushels.*	*Bushels.*	*Bush.*	*Bushels.*	*Bushels.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Bush.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Bush.*	*Tons.*
Arizona: Salt River	178,520	66,985	67,390	.....	95,285	408,180	.....	.....	22,388	.....	.....	22,388	100,936	.....	.....	.....	.....	7,470
Arizona-California: Yuma	2,489	.....	.....	.....	888	3,377	39,936	.....	63,200	.....	.....	103,136	28,862	.....	253	118	.....	.....
California: Orland	26,660	.....	.....	.....	1,360	28,020	.....	.....	48,000	.....	.....	48,000	13,760	.....	1,180	.....	.....	.....
Colorado:																		
Grand Valley	.....	15,875	43,410	.....	31,000	90,285	1,142	.....	.....	.....	.....	1,142	9,390	.....	479	1,489	.....	.....
Uncompahgre	4,118	72,737	204,366	108	320,754	602,083	1,893	343	.....	.....	.....	2,236	82,737	128	613	583	20	1,935
Idaho:																		
Boise	90,469	172,029	78,662	1,249	750,041	1,092,450	3,006	24,070	1,390	.....	248	28,714	198,459	11,385	121	2,388	.....	.....
King Hill	1,465	3,345	6,093	.....	3,569	14,472	671	150	.....	.....	.....	821	11,720	19	37	17	.....	.....
Minidoka—																		
Gravity Division	39,639	23,922	141,088	1,736	240,259	446,644	1,770	4,744	.....	.....	.....	6,514	98,464	1,523	421	1,491	.....	88
Pumping Division	30,036	930	58,330	28	297,861	387,185	751	2,869	.....	.....	.....	3,620	52,518	163	27	167	187	137
Montana:																		
Huntley	4,816	4,441	40,960	.....	83,549	133,766	4	305	.....	.....	.....	309	16,962	99	.....	.....	.....	.....
Milk River	1,302	1,552	23,758	820	26,227	53,659	65	.....	.....	2,655	.....	2,720	7,516	.....	8,807	390	.....	60
Sun River—																		
Fort Shaw Division	2,080	.....	10,355	.....	16,450	28,885	122	570	.....	700	.....	1,392	10,830	83	150	.....	.....	.....
Greenfields Division	3,264	.....	14,032	160	59,766	77,222	.....	.....	.....	4,663	.....	4,663	521	5	405	.....	.....	60
Montana-North Dakota: Lower Yellowstone	13,629	8,523	73,803	.....	111,065	207,020	15	.....	.....	5,172	.....	5,187	14,020	.....	962	990	.....	.....
Nebraska-Wyoming: North Platte—																		
North Platte Canal & Colonization Co. lands	3,137	28,512	22,768	445	3,720	58,582	.....	.....	.....	.....	.....	.....	9,087	.....	.....	.....	.....	.....
Interstate Division	98,394	191,671	216,507	5,151	96,453	608,176	30	526	.....	.....	3,235	3,791	67,483	.....	675	73	.....	.....
Fort Laramie Division	500	36,258	83,664	.....	35,938	156,360	.....	.....	.....	.....	.....	.....	1,755	.....	131	48	.....	.....
Nevada: Newlands	22,500	.....	3,375	.....	91,533	117,408	.....	.....	.....	.....	.....	.....	93,400	.....	751	.....	.....	.....
New Mexico: Carlsbad	.....	2,381	8,870	.....	3,500	14,751	6,507	.....	.....	.....	.....	6,507	18,155	.....	.....	14	.....	.....
New Mexico-Texas: Rio Grande	20,352	224,527	11,773	1,220	166,974	424,846	443	.....	6,654	.....	160	7,257	82,141	.....	1,402	892	2,334	.....
North Dakota: North Dakota Pumping	2,597	1,485	21,178	.....	5,032	30,292	.....	.....	.....	397	.....	397	196	38	1,049	602	.....	.....
Oregon: Umatilla	350	3,740	.....	110	240	4,440	106	.....	.....	.....	.....	106	32,110	.....	335	601	.....	.....
Oregon-California: Klamath	46,658	.....	45,848	11,850	44,494	148,850	.....	.....	.....	.....	.....	.....	41,227	.....	3,379	.....	.....	.....
South Dakota: Belle Fourche	25,744	62,589	112,022	.....	49,815	250,170	162	.....	.....	830	.....	992	48,734	.....	2,974	460	.....	.....
Utah: Strawberry Valley	15,138	2,953	58,245	694	235,512	312,542	50	535	100	.....	80	765	26,000	133	432	1,950	.....	880
Washington:																		
Okanogan	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	727	.....	108	54	.....	.....
Yakima—																		
Sunnyside Division	20,223	216,889	16,456	1,702	222,502	477,772	.....	.....	.....	.....	.....	.....	193,549	.....	3,062	2,485	.....	4,065
Tieton Division	32,281	36,579	13,231	.....	78,943	161,034	.....	.....	.....	.....	.....	.....	47,917	.....	625	612	.....	1,518
Wyoming: Shoshone—																		
Garland Division	4,663	395	82,384	350	154,636	242,428	16	3,591	.....	.....	.....	3,607	37,562	26	78	48	.....	.....
Frannie Division	223	256	25,251	24	30,831	56,585	5	2,013	.....	.....	18	2,036	5,345	145	140	66	.....	.....
Total	691,247	1,178,574	1,483,819	25,647	3,258,197	6,637,484	56,694	39,716	141,732	14,417	3,741	256,300	1,352,083	13,747	28,596	15,538	2,541	16,213

Summary of crop reports on Government reclamation projects in 1920—Total yields—Continued.

State and project.	Vegetables and truck.					Fruits and nuts.								Miscellaneous.			
	Beans	Onions.	Potatoes, white.	Potatoes, sweet.	Total.	Apples.	Peaches.	Pears.	Prunes.	Citrus fruit.	Small fruits.	Miscellaneous.	Total.	Beets, sugar.	Cotton.	Cotton seed.	Cane.
	Bush.	*Bush.*	*Bushels.*	*Bush.*	*Bushels.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Tons.*	*Pounds.*	*Tons.*	*Tons.*
Arizona: Salt River	1,490		11,700		13,190					11,823,000	1,848,000	13,980,000	27,651,000		28,465,000	42,700	
Arizona-California: Yuma															11,248,000	13,000	540
California: Orland									69,500	184,800	30,000	552,500	836,800				
Colorado:																	
Grand Valley			10,557		10,557	1,146,150		474,600					1,620,750	15,269			
Uncompahgre	2,969	122,862	1,397,266		1,523,097	19,816,060	774,120	78,880	4,050		74,633		20,747,743	35,373			
Idaho:																	
Boise	493	3,219	931,970	21,512	957,194	4,666,622	187,585	49,400	1,041,295		141,046		6,085,949				
King Hill			8,322		8,322	194,706		26,920			11,050		232,676				
Minidoka—																	
Gravity Division	460	4,515	332,395		337,370	589,200					127,752		716,952	34,098			
Pumping Division	65	1,700	1,192,792		1,194,557	49,135							49,135	41,378			
Montana:																	
Huntley			6,449		6,449									14,814			
Milk River			12,339		12,339												75
Sun River—																	
Fort Shaw Division			27,624		27,624												
Greenfields Division			5,581		5,581												
Montana-North Dakota: Lower Yellowstone	593		24,175		24,768									6,594			
Nebraska-Wyoming:																	
North Platte—																	
North Platte Canal & Colonization Co. lands			153,504		153,504									10,674			75
Interstate Division	661		852,733		853,394									173,494			610
Fort Laramie Division	21		28,405		28,426									6,226			20
Nevada: Newlands			36,800		36,800												
New Mexico: Carlsbad															3,366,500	3,370	100
New Mexico-Texas: Rio Grande	5,392	19,842	166	33,670	59,070	863,350	48,380	2,066,820	33,000		346,820		3,358,370		6,972,300	1,980	5,979
North Dakota: North Dakota Pumping			10,980		10,980												
Oregon: Umatilla			4,203		4,203	374,690			6,660				381,350				

Oregon-California:																	
Klamath	.....	.....	27,070	.....	27,070	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota: Belle Fourche	.....	.....	14,516	.....	14,516	.....	.....	.....	.....	.....	.....	.....	.....	10,291	.....	.....	.....
Utah: Strawberry Valley	69	.....	42,366	190	42,625	267,750	1,263,400	.....	.....	.....	28,760	.....	1,559,910	73,480	.....	.....	151
Washington:																	
Okanogan	.....	.....	3,730	.....	3,730	17,931,648	86,315	285,300	7,960	.....	210,000	.....	18,521,223	.....	.....	.....	.....
Yakima—																	
Sunnyside Division	.....	7,225	932,002	.....	939,227	58,562,163	337,810	4,642,586	2,269,239	.....	.....	.....	65,811,798	18,390	.....	.....	.....
Tieton Division	548	16,912	127,875	.....	145,335	52,526,850	1,017,040	4,840,500	.....	.....	465,595	.....	58,849,985	289	.....	.....	.....
Wyoming: Shoshone—																	
Garland Division	42	440	174,520	.....	175,002	.....	.....	.....	.....	.....	.....	.....	.....	13,467	.....	.....	.....
Frannie Division	.....	.....	3,865	.....	3,865	.....	.....	.....	.....	.....	.....	.....	.....	125	.....	.....	.....
Total	12,803	176,715	6,373,905	55,372	6,618,795	156,988,324	3,714,650	12,465,006	3,431,704	12,007,800	3,283,656	14,532,500	206,423,640	455,180	50,051,800	61,050	7,550

Summary of crop reports on Government reclamation projects in 1920—Total crop values.

State and project.	Cereals.						Other grain and seed.					
	Barley.	Corn, Indian.	Oats.	Rye.	Wheat.	Total.	Alfalfa seed.	Clover seed.	Sorghum (grain).	Flax-seed.	Millet seed.	Total.
Arizona: Salt River	$220,920	$112,540	$64,690	.....	$228,680	$626,830	.....	.....	$279,850	.....	.....	$279,850
Arizona-California: Yuma	3,040	.....	.....	.....	2,400	5,440	$527,110	.....	71,330	.....	.....	598,440
California: Orland	23,995	.....	.....	.....	2,585	26,580	.....	.....	72,000	.....	.....	72,000
Colorado:												
Grand Valley	.....	20,012	37,250	.....	55,215	112,477	11,131	.....	.....	.....	.....	11,131
Uncompahgre	5,065	73,507	146,530	$135	496,250	721,487	22,270	$4,581	.....	.....	.....	26,851
Idaho:												
Boise	54,280	137,620	51,130	1,750	1,237,570	1,482,350	25,250	216,630	1,112	.....	$200	243,192
King Hill	1,610	4,770	5,830	.....	7,910	20,120	7,280	800	.....	.....	.....	8,080
Minidoka—												
Gravity Division	31,711	23,923	63,490	2,604	288,300	410,028	15,936	54,084	.....	.....	.....	70,020
Pumping Division	24,028	930	26,202	42	357,373	408,575	6,758	34,428	.....	.....	.....	41,186
Montana:												
Huntley	4,286	3,597	27,443	.....	120,040	155,366	96	2,227	.....	.....	.....	2,323
Milk River	586	1,550	17,820	903	45,364	66,223	1,572	.....	.....	$5,580	.....	7,152
Sun River—												
Fort Shaw Division	2,080	.....	7,250	.....	20,560	29,890	1,468	2,737	.....	840	.....	5,045
Greenfields Division	3,264	.....	9,830	160	74,710	87,964	.....	.....	.....	5,600	.....	5,600
Montana-North Dakota: Lower Yellowstone	9,540	6,820	44,280	.....	194,350	254,990	225	.....	.....	9,310	.....	9,535
Nebraska-Wyoming: North Platte—												
North Platte Canal & Colonization Co. lands	1,725	21,380	13,660	445	5,580	42,790	.....	.....	.....	.....	.....	.....
Interstate Division	54,115	143,750	129,904	5,150	144,680	477,599	450	7,890	.....	.....	3,235	11,575
Fort Laramie Division	275	27,195	50,200	.....	53,907	131,577	.....	.....	.....	.....	.....	.....
Nevada: Newlands	21,380	.....	2,160	.....	137,300	160,840	.....	.....	.....	.....	.....	.....
New Mexico: Carlsbad	.....	2,749	9,070	.....	7,475	19,294	43,340	.....	.....	.....	.....	43,340
New Mexico-Texas: Rio Grande	30,106	310,617	10,888	2,860	381,099	735,570	7,650	.....	7,150	.....	306	15,106
North Dakota: North Dakota Pumping	1,662	1,485	7,624	.....	9,358	20,129	.....	.....	.....	913	.....	913
Oregon: Umatilla	406	5,012	.....	176	528	6,122	2,282	.....	.....	.....	.....	2,282
Oregon-California: Klamath	39,200	.....	33,000	14,930	76,080	163,210	.....	.....	.....	.....	.....	.....
South Dakota: Belle Fourche	11,580	46,940	50,410	.....	87,170	196,100	2,430	.....	.....	1,035	.....	3,465
Utah: Strawberry Valley	13,624	2,658	34,947	1,041	412,150	464,420	810	8,025	90	.....	200	9,125
Washington:												
Yakima—												
Sunnyside Division	22,245	216,889	12,342	2,553	389,377	643,406	.....	.....	.....	.....	.....	.....
Tieton Division	32,281	43,900	9,261	.....	138,150	223,592	.....	.....	.....	.....	.....	.....
Wyoming:												
Shoshone—												
Garland Division	7,927	593	57,667	1,050	231,954	299,191	96	21,546	.....	.....	.....	21,642
Frannie Division	379	384	17,676	72	46,177	64,688	27	12,078	.....	.....	108	12,213
Total	621,310	1,208,821	940,554	33,871	5,252,292	8,056,848	676,181	365,026	431,532	23,278	4,049	1,500,066

State and project.	Hay and forage.								Vegetables and truck.					
	Alfalfa hay.	Clover hay.	Other hay.	Corn fodder.	Peas.	Other forage.	Pasture.	Total.	Beans.	Onions.	Potatoes, white.	Potatoes, sweet.	Truck.	Total.
Arizona: Salt River	$1,816,850					$95,240	$261,960	$2,174,050	$6,250		$9,830		$1,185,280	$1,201,360
Arizona-California: Yuma	432,930		3,560	2,070			45,400	483,960					23,180	23,180
California: Orland	288,960		28,320				40,440	357,720					12,705	12,705
Colorado:														
Grand Valley	125,616		5,700	11,994		10,416	6,750	160,476			8,833		17,981	26,814
Uncompahgre	821,580	$1,050	5,222	2,738	30	15,992	38,607	885,219	9,704	$67,475	872,000		31,462	980,641
Idaho:														
Boise	1,389,210	79,695	1,090	9,550			117,140	1,596,685	1,770	2,414	1,071,760	$43,024	60,150	1,179,118
King Hill	140,120	285	495	130			2,530	143,560			20,770		13,870	34,640
Minidoka—														
Gravity Division	689,220	12,187	2,108	7,455		440	66,716	778,126	1,380	4,515	699,420		52,160	257,475
Pumping Division	367,506	1,304	135	835	280	685	37,090	407,835	195	1,700	715,621		25,245	742,761
Montana:														
Huntley	134,000	1,064					46,437	181,501			7,158		16,667	23,825
Milk River	90,190		140,910	3,900		480	205	235,685			18,510		3,730	22,240
Sun River—														
Fort Shaw Division	108,300	830	1,500				5,385	116,015			19,300		9,770	29,070
Greenfields Division	5,210	50	4,040			300	957	10,557			3,910		3,700	7,610
Montana-North Dakota: Lower Yellowstone	168,240		9,620	8,910			4,330	191,100	1,780		24,175		13,600	39,555
Nebraska-Wyoming: North Platte—														
North Platte Canal & Colonization Co. lands	90,870							90,870			115,130			115,130
Interstate Division	674,800		8,100	292			24,315	707,507	1,983		639,550		25,463	666,996
Fort Laramie Division	17,550		1,572	192			1,185	20,499	63		21,305		1,575	22,943
Nevada: Newlands	934,000		10,510				76,660	1,021,170			44,160		53,470	97,630
New Mexico: Carlsbad	338,020			157			4,697	342,874					1,526	1,526
New Mexico-Texas: Rio Grande	1,900,000		23,080	7,214	6,368		68,730	2,005,392	20,215	24,727	236	45,155	385,529	475,862
North Dakota: North Dakota Pumping	3,920	760	20,222	9,030			1,668	35,600			16,470		12,555	29,025
Oregon: Umatilla	440,230		3,956	3,858			12,722	460,766			8,532		22,120	30,652
Oregon-California: Klamath	577,170		47,300				58,500	682,970			48,720		9,600	58,320
South Dakota: Belle Fourche	389,870		23,790	2,300			67,130	483,090			18,140		14,870	33,010
Utah: Strawberry Valley	416,032	1,862	6,048	11,700		10,500	20,570	466,712	345		31,774	380	20,018	52,517
Washington:														
Okanogan	19,180		3,240	650			2,540	25,610			6,710		14,380	21,090
Yakima—														
Sunnyside Division	3,096,790		45,930	14,910		32,520	116,160	3,306,310		5,780	838,802		452,600	1,297,182
Tieton Division	718,755		9,375	3,060		12,144	24,200	767,534	1,644	12,684	115,087		46,500	175,915
Wyoming: Shoshone—														
Garland Division	300,496	260	780	480			40,559	342,575	202	660	78,534		24,337	103,733
Frannie Division	42,760	1,450	1,400	660			3,175	49,445			1,739		4,955	6,694
Total	16,538,385	100,797	408,003	102,085	6,678	178,717	1,196,758	18,531,413	45,531	119,955	4,936,176	88,559	2,558,998	7,769,219

Summary of crop reports on Government reclamation projects in 1920—Continued.

State and project.	Fruits and nuts.								Miscellaneous.					Grand total.
	Apples.	Peaches.	Pears.	Prunes.	Citru fruit.	Small fruit.	Miscel-laneous.	Total.	Beets, sugar.	Cotton and cotton seed.	Cane.	Other.	Total.	
Arizona: Salt River					$650,270	$178,580	$489,300	$1,318,150		$12,951,560			$12,951,560	$18,551,800
Arizona-California: Yuma							10,600	10,600		2,151,080	$10,800	$45,000	2,206,880	3,328,500
California: Orland				$6,255	9,240	4,500	44,500	64,495				16,200	16,200	549,700
Colorado:														
Grand Valley	$20,645		$11,195					31,840	$152,690			29,932	182,622	525,360
Uncompahgre	352,372	$20,141	1,940	283		13,434		388,170	389,103			6,029	395,132	3,397,500
Idaho:														
Boise	93,330	11,255	990	18,220		14,100		137,895				14,160	14,160	4,653,400
King Hill	7,960		1,040			1,100		10,100						216,500
Minidoka—														
Gravity Division	17,676					3,832		21,508	409,160			1,683	410,843	1,948,000
Pumping Division	1,228					1,175		2,403	496,440				496,440	2,099,200
Montana:														
Huntley									177,769			2,996	180,765	543,780
Milk River											900		900	332,200
Sun River—														
Fort Shaw Division												1,580	1,580	181,600
Greenfields Division												269	269	112,000
Montana-North Dakota: Lower Yellowstone									85,720			3,800	89,520	584,700
Nebraska-Wyoming: North Platte—														
North Platte Canal & Colonization Co. lands									133,410		300		133,710	382,500
Interstate Division									2,168,637		2,448	8,838	2,179,923	4,043,600
Fort Laramie Division									77,825		80	256	78,161	253,180
Nevada: Newlands														1,279,640
New Mexico: Carlsbad										555,480	1,286		556,766	963,800
New Mexico-Texas: Rio Grande	26,400	1,992	88,015	1,320		15,780		133,507		1,188,294	69,500	15,969	1,273,763	4,639,200
North Dakota: North Dakota Pumping												1,113	1,113	86,780
Oregon: Umatilla	15,362			333		2,843		18,538				1,110	1,110	519,470
Oregon-California: Klamath														904,500
South Dakota: Belle Fourche									108,055			8,480	116,535	832,200
Utah: Strawberry Valley	7,440	52,642				8,979		69,061	881,800		2,265		884,065	1,945,900
Washington:														
Okanogan	358,630	3,450	11,410	480		10,530		384,500						431,200
Yakima—														
Sunnyside Division	2,342,486	16,891	185,703	113,462		110,700		2,769,242	239,070			75,190	314,260	8,330,400
Tieton Division	1,838,450	61,022	193,620			58,199		2,151,291	3,468			149,600	153,068	3,471,400
Wyoming: Shoshone—														
Garland Division									161,604			355	161,959	929,100
Frannie Division									1,500				1,500	134,540
Total	5,081,979	167,393	493,913	140,353	659,510	423,752	544,400	7,511,300	5,486,251	16,846,414	87,579	382,560	22,802,804	66,171,650

LIVE STOCK AND EQUIPMENT.

Inventory of live stock and equipment on reclamation project farms at close of 1920.

State and project.	Horses.			Mules.			Cattle.					
							Beef.			Dairy.		
	Number.	Value.		Number.	Value.		Number.	Value.		Number.	Value.	
		Each.	Total.		Each.	Total.		Each.	Total.		Each.	Total.
Arizona: Salt River	9,146	$60.00	$548,760	4,126	$100.00	$412,600	9,065	$70.00	$634,550	11,246	$80.00	$899,680
Arizona-California: Yuma	3,433	89.13	305,985	1,372	109.50	150,230	401	57.87	23,205	1,215	82.83	100,642
California: Orland	[3] 1,019	100.00	101,900	.....	.....	.....	547	29.24	15,995	2,014	90.78	182,835
Colorado:												
Grand Valley	1,058	120.81	127,815	41	110.24	4,520	[4] 1,046	42.42	44,370	.....	.....	.....
Uncompahgre	6,119	96.68	591,595	250	110.42	27,605	12,229	36.20	442,696	[5] 3,370	86.00	290,277
Idaho:												
Boise	7,101	77.46	550,076	181	93.26	16,880	1,970	37.18	73,240	[6] 6,839	81.80	559,449
King Hill	520	103.10	53,615	15	143.33	2,150	2,179	34.12	74,950	424	74.36	31,530
Minidoka—												
Gravity Division	5,345	76.33	408,007	109	85.96	9,370	903	57.26	51,705	3,792	75.67	286,968
Pumping Division	3,371	83.02	279,860	77	97.61	7,516	216	80.37	17,360	2,582	68.22	176,140
Montana:												
Huntley	2,041	88.90	181,445	34	94.40	3,210	1,312	42.90	56,416	1,804	63.45	114,464
Milk River	2,460	77.00	189,500	17	165.00	2,805	[4] 2,900	56.00	162,400	.....	.....	.....
Sun River—												
Fort Shaw Division [7]	715	88.69	63,415	7	89.28	625	626	39.56	24,770	711	67.05	47,675
Greenfields Division	694	100.79	69,955	14	96.42	1,350	395	52.13	20,595	268	128.84	34,530
Montana-North Dakota: Lower Yellowstone	1,876	100.00	187,600	.....	.....	.....	1,930	53.00	102,290	1,300	70.00	91,000
Nebraska-Wyoming: North Platte—												
Interstate Division [8]	7,200	100.00	720,000	160	110.00	17,600	[4] 6,500	50.00	325,000	.....	.....	.....
Fort Laramie Division	477	100.00	47,700	.....	.....	.....	856	50.00	42,800	.....	.....	.....
Nevada: Newlands	3,641	89.68	326,540	234	105.22	24,621	7,428	37.88	281,390	2,072	98.91	204,940
New Mexico: Carlsbad	1,023	107.84	110,325	233	124.70	29,055	[4] 479	75.76	36,291	.....	.....	.....
New Mexico-Texas: Rio Grande	6,903	62.88	434,191	1,376	104.71	144,080	[4] 5,526	78.75	434,507	.....	.....	.....
North Dakota: North Dakota pumping	308	86.36	26,600	2	135.00	270	275	53.95	14,835	305	92.95	28,350

[3] Horses and mules.
[4] Beef and dairy cattle.
[5] Includes 125 registered bulls, valued at $430.90 each.
[6] Includes 468 registered bulls, valued at $150.64 each.
[7] Three units farmed "dry" and 12 units having no crop, the stock yield and equipment of which are added to this report, include 3 horses, total value $150; 5 dairy cattle, total value $375; equipment, $50.
[8] In the fall of 1920, in addition to the above report, there were brought on the project, for winter feeding or for fattening, 39,000 sheep, 5,000 cattle, and 200 horses.

Inventory of live stock and equipment on reclamation project farms at close of 1920—Continued.

State and project.	Horses.			Mules.			Cattle.					
							Beef.			Dairy.		
	Number.	Value.		Number.	Value.		Number.	Value.		Number.	Value.	
		Each.	Total.		Each.	Total.		Each.	Total.		Each.	Total.
Oregon: Umatilla	1,098	$90.82	$99,720	31	$113.71	$3,525	51	$100.98	$5,150	1,162	$80.07	$93,041
Oregon-California: Klamath	2,089	100.00	208,900	50	125.00	6,250	[4] 6,503	60.00	390,180			
South Dakota: Belle Fourche	3,608	68.30	246,353	100	53.45	5,345	3,751	46.30	173,692	2,969	58.29	173,075
Utah: Strawberry Valley	2,175	100.00	217,500	22	100.00	2,200	[4] 5,427	50.00	271,350			
Washington:												
Okanogan	460	107.42	49,412	8	156.25	1,250	181	52.00	9,350	408	69.00	28,175
Yakima—												
Sunnyside Division	7,389	96.54	713,319	209	117.06	24,465	[4] 10,295	61.73	635,476			
Tieton Division	1,931	96.85	187,000	47	128.70	6,050	[4] 2,710	68.45	185,448			
Wyoming: Shoshone—												
Garland Division	2,192	102.49	224,655	113	139.07	15,715	1,069	52.54	56,160	1,187	68.67	81,506
Frannie Division	575	103.84	59,710	27	111.66	3,015	84	46.07	3,870	321	69.16	22,200
Total and average	85,967	85.28	7,331,453	8,855	104.13	922,302	86,854	53.07	4,610,041	43,989	78.35	3,446,477

State and project.	Sheep.			Hogs.			Fowls.		
	Number.	Value.		Number.	Value.		Number.	Value.	
		Each.	Total.		Each.	Total.		Each.	Total.
Arizona: Salt River	5,137	$7.50	$38,528	8,662	$16.00	$138,592	[1] 254,572	$0.95	$239,841
Arizona-California: Yuma	747	7.36	5,505	1,680	13.17	22,117	30,815	1.07	32,853
California: Orland	1,848	7.50	13,860	2,973	21.00	62,433	73,077	1.33	97,176
Colorado:									
Grand Valley	1,787	5.30	9,480	980	12.83	12,570	11,218	.99	11,075
Uncompahgre	10,756	6.96	74,864	8,934	11.74	104,866	76,184	.70	53,757
Idaho:									
Boise	12,305	7.48	92,083	7,487	14.17	106,103	97,880	1.20	117,826
King Hill	531	9.45	5,018	298	17.40	5,183	9,556	11.02	10,534
Minidoka—									
Gravity Division	6,262	8.10	50,772	5,154	12.72	62,217	42,348	.71	29,875
Pumping Division	7,466	7.48	55,844	4,741	10.91	51,725	28,275	.74	20,873

Montana:									
Huntley	2,382	6.19	14,745	1,885	11.15	21,018	18,232	.69	12,680
Milk River	8,000	16.44	131,520	1,180	14.41	17,003	9,589	.75	7,191
Sun River—									
Fort Shaw Division [7]	665	6.28	4,176	283	17.44	4,938	6,218	1.08	6,743
Greenfields Division	298	10.30	3,070	177	23.44	4,150	4,015	1.03	4,140
Montana-North Dakota: Lower Yellowstone	485	9.00	4,365	1,600	14.00	22,600	13,800	.55	7,590
Nebraska-Wyoming: North Platte—									
Interstate Division [8]	1,100	5.00	5,500	7,000	10.00	70,000	64,000	.60	38,400
Fort Laramie Division				730	10.00	7,300	3,312	.60	1,987
Nevada: Newlands	4,611	10.21	47,067	2,211	14.22	31,443	[9] 32,404	1.32	42,746
New Mexico: Carlsbad	94	10.26	964	426	15.85	6,753	11,342	.93	10,543
New Mexico-Texas: Rio Grande	[12] 3,320	8.75	29,068	10,437	12.65	126,575	100,314	1.47	147,589
North Dakota: North Dakota Pumping	53	38.21	2,025	335	14.06	4,710	2,903	1.03	2,989
Oregon: Umatilla	1,626	8.56	13,919	1,567	20.81	32,609	19,078	1.03	19,650
Oregon-California: Klamath	29,006	8.00	232,048	2,720	10.00	27,200	19,916	1.00	19,916
South Dakota: Belle Fourche	34,781	6.48	225,325	11,037	8.86	97,859	20,584	.68	14,151
Utah: Strawberry Valley	2,035	5.00	10,175	1,793	30.00	53,790			
Washington:									
Okanogan				373	20.92	7,805	6,238	1.00	6,238
Yakima—									
Sunnyside Division	5,894	7.65	45,014	14,530	15.37	223,380	146,757	1.04	153,003
Tieton Division	570	7.60	4,346	3,611	13.80	49,911	36,035	1.06	38,158
Wyoming: Shoshone—									
Garland Division	4,540	7.06	32,028	1,697	11.81	19,484	30,940	.78	24,249
Frannic Division	2,165	11.41	24,695	737	12.11	8,927	8,839	1.00	8,831
Total and average	148,464	7.92	1,176,004	105,238	13.23	1,493,261	1,178,441	1.00	1,180,604

State and project.	Bees (hives).			Total stock value.	Value of equipment.	Total stock and equipment.	Increase or decrease in value over 1919.		
	Number.	Value.					Stock.	Equipment.	Total.
		Each.	Total.						
Arizona: Salt River	13,819	$8.10	$111,934	[2] $3,025,970	$771,000	$3,796,970	−$3,497,117	$470,700	−$3,026,417
Arizona-California: Yuma	8,000	10.00	80,000	720,537	523,305	1,243,842	−134,559	94,852	−39,707
California: Orland	262	10.23	2,680	476,879	315,108	791,987	−98,847	77,778	−21,069
Colorado:									
Grand Valley	123	7.28	896	210,726	113,425	324,151	15,648	22,773	38,421
Uncompahgre	1,917	7.18	13,767	1,599,427	733,280	2,332,707	−159,761	156,298	−3,463

[4] Beef and dairy cattle.
[1] 248,774 chickens, $223,896, or 90 cents each; 5,798 turkeys, geese, and other large fowl, $15,945, or $2.75 each.
[7] Three units farmed "dry" and 12 units having no crop, the stock yield and equipment of which are added to this report, include 3 horses, total value $150; 5 dairy cattle, total $375; equipment $50.
[8] In the fall of 1920, in addition to the above report, there were brought on the project, for winter feeding or for fattening, 39,000 sheep, 5,000 cattle, and 200 horses.
[9] 3,624 turkeys, $13,310, or $3.67 each; 28,780 other fowl, $29,436, or $1.02 each.
[12] Includes goats.
[2] Includes 99 ostriches, $1,485, or $15 each.

Inventory of live stock and equipment on reclamation project farms at close of 1920—Continued.

State and project.	Bees (hives).			Total stock value.	Value of equipment.	Total stock and equipment.	Increase or decrease in value over 1919.		
	Number.	Value.					Stock.	Equipment.	Total.
		Each.	Total.						
Idaho:									
Boise	2,584	$5.50	$14,219	$1,529,876	$2,098,565	$3,628,441	−$371,827	$1,204,628	$832,801
King Hill	195	7.00	1,367	184,347	74,940	259,287	57,353	16,733	74,086
Minidoka—									
Gravity Division	919	7.43	6,831	905,745	573,985	1,479,730	−182,543	43,864	−138,679
Pumping Division	497	9.94	4,941	614,259	464,515	1,078,774	−310,637	10,473	−300,164
Montana:									
Huntley	180	7.30	1,314	405,292	259,707	664,999	−180,337	−11,653	−191,990
Milk River	8	15.00	120	510,539	214,070	724,609	−11,283	42,690	31,407
Sun River—									
Fort Shaw Division [7]	505	19.16	9,680	162,022	83,681	245,703	−24,960	−728	−25,688
Greenfields Division	.....	.....	.....	137,790	133,240	271,030	15,252	28,030	43,282
Montana-North Dakota: Lower Yellowstone	320	8.50	2,720	418,165	206,400	624,565	−47,896	12,400	−35,496
Nebraska-Wyoming: North Platte—									
Interstate Division [8]	640	4.00	2,560	1,179,060	970,000	2,149,060	−249,442	170,000	−79,442
Fort Laramie Division	117	4.00	468	100,255	.....	100,255	100,255	.....	100,255
Nevada: Newlands	2,683	14.43	38,721	997,468	449,050	1,446,518	34,540	129,511	164,051
New Mexico: Carlsbad	[10] 1,234	10.34	12,764	206,695	[11] 215,060	421,755	−19,805	44,060	24,255
New Mexico-Texas: Rio Grande	2,781	7.08	19,692	1,335,702	559,257	1,894,959	274,856	110,666	385,522
North Dakota: North Dakota Pumping	10	23.00	230	80,009	32,680	112,689	8,413	1,655	10,068
Oregon: Umatilla	2,663	8.95	23,834	291,448	217,152	508,600	[13] −39,067	81,051	41,984
Oregon-California: Klamath	424	10.00	4,240	888,734	262,565	1,151,299	−22,655	−6,261	−28,916
South Dakota: Belle Fourche	243	8.63	2,096	937,896	350,516	1,288,412	−1,000,889	−193,474	−1,194,363
Utah: Strawberry Valley	124	10.00	1,240	556,255	[14] 129,600	685,855	([15])	([15])	([15])
Washington:									
Okanogan	427	10.00	4,270	106,500	515,250	621,750	−23,840	179,600	155,760
Yakima—									
Sunnyside Division	3,047	7.73	23,553	1,818,210	[16] 2,516,179	4,334,389	−112,798	588,223	475,425
Tieton Division	710	8.07	5,733	476,646	[17] 730,614	1,207,260	10,016	142,558	152,574
Wyoming: Shoshone—									
Garland Division	1,417	8.29	11,749	465,546	311,390	776,936	−85,450	−26,520	−111,970
Frannie Division	152	19.07	2,900	134,148	103,506	237,654	−33,884	50,021	16,137
Total and average	46,001	8.80	404,519	20,476,146	13,928,040	34,404,186	−6,091,264	3,439,928	−2,651,336

[7] Three units farmed "dry" and 12 units having no crop, the stock yield and equipment of which are added to this report, include 3 horses, total value $150, 5 dairy cattle, total value $375; equipment $50.

[8] In the fall of 1920, in addition to the above report, there were brought on the project, for winter feeding or fattening, 39,000 sheep, 5,000 cattle, and 200 horses.

[10] 45,000 pounds of honey produced on the project sold for 22 cents a pound, or a total of $9,900, equal to a value of $8.02 per hive.

[11] Includes 140 automobiles, 17 of which are tractors.

[13] Decrease in the number of sheep due to the early date census was taken.

[14] Binders, 123; thrashers, 12; trucks, 15; tractors, 24.

[15] No report last year, hence no comparison.

[16] Includes 2,357 motor vehicles, valued at $1,437,568, or $610 each.

[17] Includes 590 motor vehicles, valued at $429,710.

ADMINISTRATIVE ORGANIZATION.

DEPARTMENT OF THE INTERIOR.

Hon. Albert B. Fall, Secretary of the Interior.
Edward C. Finney, First Assistant Secretary.
Francis M. Goodwin, Assistant Secretary.
Edwin S. Booth, Solicitor for the Interior Department.
Charles V. Safford, Administrative Assistant to the Secretary.
Charles W. Nestler, Administrative Assistant to the Secretary.
Harry G. Clunn, Private Secretary to the Secretary.
John Harvey, Chief Clerk and Superintendent of Buildings.

UNITED STATES RECLAMATION SERVICE.

WASHINGTON, D. C.

Arthur Powell Davis, director; Morris Bien, assistant director; Ottamar Hamele, chief counsel; J. B. Beadle, director's assistant; C. J. Blanchard, statistician; Hugh A. Brown, editor and office assistant; C. A. Bissell, engineer; A. H. Gullickson, chief accountant; Miss H. A. Fellows and Raymond Depue, fiscal agents; C. H. Fitch, chief clerk; Emmet Carr, purchasing agent; G. W. Numbers, appointment clerk; H. N. Bickel, Yakima, Wash., W. A. Meyer, Denver, Colo., and W. F. Kubach, Great Falls, Mont., examiners of accounts.

DENVER, COLO.

F. E. Weymouth, chief engineer, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chief engineers; Miss L. H. Meisel, secretary to the chief engineer; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; J. L. Burkholder, drainage engineer; W. L. Drager, office engineer; J. M. Luney, chief clerk; A. McD. Brooks, purchasing agent; Harry Caden, special fiscal agent.

FIELD LEGAL OFFICES.

Boise, Idaho.—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement; R. M. Patrick, district counsel located at American Falls, Idaho.

Denver, Colo.—Law section office of chief engineer: E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel.

El Paso, Tex.—P. W. Dent, district counsel. Projects: Rio Grande, Carlsbad, and Hondo.

Las Cruces, N. M.—Mark B. Thompson, attorney in charge of litigation on Rio Grande and Carlsbad projects.

Helena, Mont.—W. J. Egleston, district counsel, Helena, Mont. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

Mitchell, Nebr.—J. N. Beardslee, district counsel. Projects: North Platte and Belle Fourche.

Montrose, Colo.—J. R. Alexander, district counsel. Projects: Grand Valley, Uncompahgre, and Strawberry Valley.

Portland, Oreg.—H. L. Holgate and D. G. Tyree, district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

San Francisco, Calif.—Henry A. Cox and A. B. Fullerton, district counsel, 349 Pacific Building. Projects: Salt River, Yuma, Orland, and Newlands.

PROJECT ORGANIZATION.

Belle Fourche Project.—B. E. Hayden, project manager, Newell, S. Dak.; R. C. Walber, chief clerk; August Lewin, fiscal agent.

Boise Project.—J. B. Bond, project manager, Boise, Idaho; E. R. Mills, chief clerk; C. F. Weinkauf, fiscal agent.

Carlsbad Project.—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

Grand Valley Project.—S. O. Harper, project manager, Grand Junction, Colo.; A. W. Walker, engineer; G. H. Murphy, chief clerk; A. H. Hall, fiscal agent.

Huntley Project.—A. R. McGinness, project manager, Ballantine, Mont.; G. H. Bolt, chief clerk; Miss M. C. Simek, fiscal agent.

King Hill Project.—Walter Ward, project manager, King Hill, Idaho; T. W. Hause, chief clerk; L. D. Eakin, fiscal agent.

Klamath Project.—H. D. Newell, project manager, Klamath Falls, Oreg.; N. G. Wheeler, chief clerk; G. R. Barnhart, fiscal agent.

Lower Yellowstone Project.—L. H. Mitchell, project manager, Savage, Mont.; C. A. Denman, chief clerk.

Milk River Project.—G. E. Stratton, project manager, Malta, Mont.; E. E. Chabot, chief clerk; G. S. Moore, fiscal agent.

Minidoka Project.—Barry Dibble, project manager, Burley, Idaho; Dana Templin, engineer; E. C. Diehl, chief clerk; Miss A. J. Larson, fiscal agent; F. A. Banks, engineer, American Falls, Idaho.

Newlands Project.—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

North Dakota Pumping Project.—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.; H. C. Melaas, fiscal agent.

North Platte Project.—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Division; Paul Rothi, irrigation manager; J. R. Ummel, chief clerk; Miss A. L. Perrine, fiscal agent.

Okanogan Project.—Calvin Casteel, project manager, Okanogan, Wash.; W. D. Funk, chief clerk and fiscal agent; H. J. Gault, engineer, Conconully, Wash.

Orland Project.—R. C. E. Weber, project manager, Orland, Calif.; E. T. Eriksen, engineer; C. H. Lillingston, chief clerk and fiscal agent.

Rio Grande Project.—L. M. Lawson, project manager, El Paso, Tex.; T. W. Parry, irrigation manager; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

Riverton Project.—H. D. Comstock, project manager, Riverton, Wyo.; R. M. Conner, engineer; G. H. Baird, chief clerk; J. C. Thrailkill, fiscal agent.

St. Mary Storage Division.—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk; H. E. Bruce, fiscal agent.

Salt River Project.—Being operated by the Salt River Valley Water Users' Association; C. C. Cragin, general superintendent and chief engineer, Phoenix, Ariz.

Shoshone Project.—J. S. Longwell, project manager, Powell, Wyo.; J. R. Iakisch, engineer; C. M. Jump, superintendent of irrigation; W. F. Sha, chief clerk; Miss L. C. Drinkwalter, fiscal agent.

Strawberry Valley Project.—W. L. Whittemore, project manager, Provo, Utah; J. E. Overlade, chief clerk and fiscal agent.

Sun River Project.—G. O. Sanford, project manager, Great Falls, Mont.; H. W. Johnson, chief clerk; Miss M. G. Valentine, fiscal agent; G. A. Benjamin, irrigation manager, Fairfield, Mont.

Umatilla Project.—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; G. C. Patterson, chief clerk and fiscal agent.

Uncompahgre Project.—L. J. Foster, project manager, Montrose, Colo.; A. H. Peach, chief clerk and fiscal agent.

Yakima Project.—J. L. Lytel, project manager, Yakima, Wash.; C. E. Crownover and C. F. Gleason, engineers; R. K. Cunningham, chief clerk; J. C. Gawler, fiscal agent; J. G. Heinz, engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.; F. T. Crowe, engineer in charge construction Tieton Dam, Rimrock, Wash.; V. G. Evans, chief clerk; C. B. Funk, fiscal agent.

Yuma Project.—P. J. Preston, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; S. A. McWilliams, engineer, Yuma Mesa Division; E. R. Scheppelmann, chief clerk; E. M. Philebaum, fiscal agent.

INDIAN PROJECTS.

Blackfeet Project.—R. M. Snell, project manager, Browning, Mont.; F. H. Shiner, chief clerk and fiscal agent.

Flathead Project.—C. J. Moody, project manager, St. Ignatius, Mont.; F. F. Smith and N. B. Hunt, engineers; J. M. Swan, chief clerk; J. P. Siebeneicher, fiscal agent.

Fort Peck Project.—S. A. Kerr, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

DISTRIBUTION OF EMPLOYEES.

Employees, June, 1921.

Office or project.	Educational.	Non-educational.	Others.	Total, United States.	Contractors.	Grand total.
Washington office	83	.....	4	87	.....	87
Denver office	87	.....	.....	87	.....	87
Field offices, district counsel	25	.....	.....	25	.....	25
Consulting engineers, etc	34	.....	.....	34	.....	34
Examiners of accounts	3	.....	.....	3	.....	3
Arizona:						
Salt River [1]	.....	.....	.....	.....	.....	.....
Yuma Auxiliary	1	17	46	64	.....	64
Arizona-California: Yuma	13	63	266	342	.....	342
California: Orland	6	10	8	24	.....	24
Colorado:						
Grand Valley	10	35	43	88	.....	88
Uncompahgre Valley	8	50	78	136	.....	136
Idaho:						
Boise	23	98	170	291	.....	291
King Hill	9	32	45	86	.....	86
Minidoka	31	85	88	204	.....	204
Montana:						
Huntley	4	14	15	33	.....	33
Milk River distribution	18	44	83	145	45	190
St. Mary Storage	4	9	34	47	.....	47
Sun River	9	26	39	74	11	85
Montana-North Dakota: Lower Yellowstone	4	17	32	53	.....	53
Nebraska-Wyoming: North Platte	35	164	321	520	35	555
Nevada: Newlands	14	36	10	60	.....	60
New Mexico: Carlsbad	5	11	13	29	.....	29
New Mexico-Texas: Rio Grande	37	137	382	556	12	568
North Dakota: North Dakota Pumping	5	14	31	50	.....	50
Oregon: Umatilla	8	14	25	47	.....	47
Oregon-California: Klamath	8	51	137	196	.....	196
South Dakota: Belle Fourche	8	34	34	76	25	101
Utah: Strawberry Valley	6	18	39	63	.....	63
Washington:						
Okanogan	6	26	65	97	.....	97
Yakima office and storage, operation and maintenance	14	19	12	45	.....	45
Yakima storage construction	10	47	281	338	.....	338
Yakima-Sunnyside	6	30	15	51	.....	51
Yakima-Tieton	3	16	15	34	.....	34
Wyoming:						
Riverton	7	15	36	58	.....	58
Shoshone	25	85	141	251	.....	251
INDIAN PROJECTS						
Montana:						
Blackfeet	2	12	14	28	.....	28
Fort Peck	2	7	17	26	.....	26
Flathead	8	53	98	159	19	178
Total, June, 1921	581	1,289	2,637	4,507	147	4,654
June, 1920	503	1,034	2,246	3,783	15	3,798
June, 1919	555	951	2,313	3,819	112	3,931
June, 1918	507	1,301	3,480	5,288	301	5,589
June, 1917	525	1,365	4,593	6,483	667	7,150
June, 1916	507	1,154	3,749	5,410	672	6,082
June, 1915	580	1,738	6,055	8,373	2,147	10,520
June, 1914	541	1,553	6,076	8,170	1,058	9,228
June, 1913	478	1,207	4,926	6,611	1,005	7,616
June, 1912	494	1,235	4,739	6,468	626	7,094
June, 1911	1,699		6,576	8,275	1,306	9,584
June, 1910	1,560		3,863	5,423	815	6,238
June, 1909	1,128		3,736	4,864	1,200	6,061
June, 1908	900		3,345	4,245	1,600	5,845
June, 1907	359		6,204	6,563	7,889	14,452
June, 1906	350		2,648	2,998	4,107	7,105

[1] Operation and maintenance of project transferred to water users Nov. 1, 1917.

WAGES.

Approximate average daily wages, common labor, 1914–1921.

State and project.	1914		1915		1916		1917		1918		1919		1920		1921	Increase in 7 years.
	June.	Dec.	June.	Dec.	June.	Dec.	June.	Dec.	June.	Dec.	June.	Dec.	June.	Dec.	June.	
Arizona: Salt River	$2.00	$1.75	$1.90	$1.90	$2.15	$2.15	$2.25	$2.60	$3.00	$3.00	$3.00	$3.00	$3.50	$3.50	$2.00	.....
Arizona-California: Yuma	2.00	2.00	2.00	2.00	2.00	2.20	2.40	2.75	3.00	3.00	3.00	3.00	3.85	3.57	2.75	$0.75
California: Orland	2.50	2.50	2.40	2.50	2.50	2.75	2.75	2.75	3.25	3.60	3.50	4.00	4.25	4.00	3.50	1.00
Colorado:																
Grand Valley	2.25	2.40	2.30	2.50	2.50	2.50	2.65	3.00	3.00	3.20	3.20	3.60	3.60	3.60	3.20	.95
Uncompahgre	2.12	2.25	2.61	2.50	2.50	2.50	2.50	3.25	3.25	3.30	3.50	3.50	4.00	3.75	3.00	.88
Idaho:																
Boise—																
Distribution Division	2.30	2.40	2.50	2.25	2.40	2.40	2.40	3.00	3.30	3.60	3.80	4.00	4.25	4.50	3.73	1.43
Storage Division	2.50	2.50	2.50	2.50	2.50	2.50	2.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
King Hill	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.38	4.02	4.03	4.36	3.32	.....
Minidoka—																
Distribution Division	2.25	2.25	2.25	2.25	2.25	2.25	3.00	3.50	3.50	3.55	3.50	4.00	4.06	4.26	3.01	.76
Idaho-Wyoming: Storage Division (Jackson Lake)	2.50	2.50	2.50	2.50	2.50	2.50	2.75	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montana:																
Huntley	2.50	2.50	2.24	2.45	2.25	2.75	2.75	3.30	3.30	3.30	3.30	4.06	4.06	4.40	3.77	1.27
Milk River—																
Distribution Division	2.50	2.65	2.60	2.70	2.80	2.80	3.00	3.20	3.30	3.50	3.58	3.96	3.96	3.96	3.60	1.10
St. Mary Storage Division	2.50	2.50	2.40	2.56	2.50	2.72	2.86	3.00	3.60	3.50	3.71	4.52	4.52	4.86	3.88	1.38
Sun River	2.25	2.24	2.18	2.40	2.50	2.72	3.00	3.25	3.58	3.90	3.65	4.00	4.85	4.50	3.62	1.37
Montana-North Dakota: Lower Yellowstone	2.25	2.35	2.25	2.40	2.25	2.75	2.75	3.00	3.00	3.00	2.20	3.50	3.76	3.00	3.00	.75
Nebraska-Wyoming: North Platte—																
Interstate Division	2.12	2.35	2.40	2.40	2.40	2.40	2.50	2.88	3.20	3.28	3.33	4.20	4.29	4.29	3.65	1.53
Fort Laramie Division	.....	.....	.....	2.00	2.30	2.40	2.50	3.04	3.20	3.28	.....	.....	.....	.....	.....	.....
Nevada: Newlands	2.20	2.50	2.50	2.50	2.50	2.50	2.75	3.50	3.75	4.06	3.68	4.25	4.78	4.91	4.18	1.98
New Mexico: Carlsbad	1.50	1.50	1.50	1.63	1.63	1.76	1.76	2.00	2.00	2.00	2.25	3.25	3.75	3.50	1.76	.26
New Mexico-Texas: Rio Grande—																
Distribution Division	1.25	1.25	1.50	1.50	1.58	1.50	1.75	1.75	1.75	1.75	1.65	1.75	1.75	2.00	1.50	.25
Elephant Butte Storage	1.67	1.67	1.67	1.70	1.72	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Dakota: North Dakota Pumping	2.50	2.50	2.50	2.50	2.50	2.50	2.75	2.75	2.87	3.80	4.25	4.75	5.45	4.82	3.86	1.36
Oregon: Umatilla	2.40	2.40	2.40	2.40	2.40	2.50	2.80	3.00	3.50	4.00	4.00	4.20	4.75	4.00	4.00	1.60
Oregon-California: Klamath	2.48	2.48	2.48	2.48	2.50	2.50	2.72	3.30	3.50	3.50	3.88	4.64	4.82	5.50	3.64	1.16
South Dakota: Belle Fourche	2.24	2.24	2.50	2.50	2.52	3.00	2.80	3.00	3.25	3.65	4.00	4.20	4.37	4.60	3.24	1.00
Utah: Strawberry Valley	2.50	2.50	2.50	2.25	2.37	2.60	2.80	3.00	3.25	3.25	3.25	4.25	4.50	4.50	5.00	2.50

Washington:																
Okanogan	2.50	2.50	2.20	2.20	2.20	2.60	2.80	3.00	3.20	3.50	3.44	4.36	4.50	4.76	3.50	1.00
Yakima—																
Storage Division	2.20	2.20	2.60	2.20	2.60	2.80	3.00	2.90	3.00	4.00	4.00	4.00	5.00	5.00	3.60	1.40
Sunnyside Division	2.20	2.00	2.00	2.20	2.20	2.40	2.60	3.00	3.30	3.60	3.85	4.00	4.50	4.50	3.60	1.40
Tieton Division	2.00	2.20	2.20	2.20	2.40	2.60	2.75	3.00	3.30	4.00	4.00	4.50	4.50	4.75	4.00	2.00
Wyoming:																
Riverton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.00	4.00	4.25	4.52	4.00	.....
Shoshone	2.40	2.40	2.40	2.40	2.40	2.75	2.93	3.34	3.50	3.60	3.60	4.36	4.76	4.50	3.50	1.10
INDIAN PROJECTS.																
Montana:																
Blackfeet	2.40	2.40	2.40	2.40	2.50	2.50	2.50	2.50	3.28	3.00	3.42	4.53	4.53	4.53	3.89	1.49
Flathead	2.50	2.50	2.25	2.50	2.65	2.75	2.90	3.20	3.50	4.00	4.00	4.00	4.50	4.75	3.50	1.00
Fort Peck	2.50	2.50	2.50	2.56	2.50	2.70	2.80	3.15	3.30	3.40	3.50	3.90	4.25	4.63	3.56	1.06
Estimated average	2.23	2.26	2.27	2.28	2.33	2.48	2.63	2.96	3.18	3.47	3.50	3.90	4.29	4.25	3.43	1.20

ENGINEERING ARTICLES RELATING TO THE WORK OF THE SERVICE.

The following is a partial list of engineering articles relating to the work of the Reclamation Service as published in engineering and technical journals. The list is printed for the information of engineers and others interested in the work, and is a continuation of similar lists published in previous annual reports and also printed as separates for distribution.

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Sources and cost of power for pumping irrigation water. H. A. Storrs, Eng. News, Dec. 15, 1904, vol. 52, p. 548.

Lea's hydrographic surveying. Review of Manual. E. C. Murphy, Eng. News, Jan. 18, 1906, vol. 55, p. 81.

Winning the West: An account of the marvelous progress of our Reclamation Service in reclaiming the desert. Illus. C. J. Blanchard, Natl. Geographic Magazine, Feb., 1906, vol. 17, pp. 82–99.

Irrigation and drainage investigation, Office of Experiment Stations. Elwood Mead, Eng. News, Feb. 1, 1906, vol. 55, p. 135.

The U. S. Reclamation Service fund. (Short item.) Eng. News, Feb. 1, 1906, vol. 55, p. 137.

Public land surveys by Government in Indian Territory. Charles H. Fitch, Eng. News, Feb. 8, 1906, vol. 55, pp. 151–152; Apr. 19, 1906, vol. 55, p. 450.

Vibrations in large gates for deep reservoirs. (Short news item.) Charles R. Steiner, Eng. News, Jan. 11, 1906, vol. 55, p. 43, Mar. 8, 1906, vol 55, p. 269.

Thread of mean stream velocities. F. W. Hanna, Eng. News, Apr. 12, 1906, vol. 55, pp. 417–418.

Diagrams for the strength of steel and wooden columns. Louis Ross, Eng. News, Apr. 26, 1906, vol. 55, p. 470.

Low unit-storage costs of some U. S. Reclamation Service reservoirs. Eng. News, May 10, 1906, vol. 55, p. 522.

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Irrigation at Ogalla, Nebr., from an underflow canal. Illus. Chas. S. Slichter, Eng. News, July 5, 1906, vol. 56, pp. 4–6.

Irrigation projects under construction by U. S. Reclamation Service. (Short news item.) Eng. News, Aug. 9, 1906, vol. 56, p. 154.

Allotments to U. S. reclamation fund (news item), showing allotments by States and projects. Eng. News, Aug. 16, 1906, vol. 56, p. 179.

Report on inspection of irrigation works made by F. H. Newell. (Short news item.) Eng. News, Dec. 6, 1906, vol. 56, p. 600.

Cooperative action of Indian Office and State of Wyoming. (Portion of Shoshone Indian Reservation.) Eng. News, Dec. 20, 1906, vol. 56, p. 653.

Appropriation for river control. (Message to Congress.) Theodore Roosevelt, Eng. News, Jan. 24, 1907, vol. 57, pp. 77–78.

Resignation of Dr. Walcott from directorship of U. S. Geological Survey. (Editorial.) Eng. News. Jan. 31, 1907, vol. 57, p. 133.

Dr. Walcott elected Secretary Smithsonian Institute. (Short news item.) Eng. News, Feb. 7, 1907, vol. 57, p. 144.

Reinforced concrete, economic design of. F. W. Hanna, Eng. News, Feb. 21, 1907, pp. 203–204.

Formula for conditions of economy in reinforced concrete. F. W. Hanna, Eng. News, Mar. 2, 1907, vol. 57, p. 329.

Achievements of national irrigation. Illus. Literary Digest, Apr. 13, 1907, vol.,—pp. 572–573.

Investigations of canal linings for University of California. (News item.) Elwood Mead, Eng. News, May 2, 1907, vol. 57, p. 486.

Effect of changes in canal cross-sections, upon rate of flow. F. W. Hanna, Eng. News, June 6, 1907, vol. 57, pp. 630–631.

Observations to determine the value of "C" and "N" as in Kutter formula. Illus. J. B. Lippincott, Eng. News, June 6, 1907, vol. 57, pp. 612–614.

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Water and electric power systems of Portland Railway, Light & Power Co., supplied from Willamette and Clackamas Rivers.. Illus. W. P. Hardesty, Eng. News, June 27, 1907, vol. 57, pp. 699–705.

Estimating stream discharge from limited number of gagings; method (Dwg.). J. C. Stevens, Eng. News, July 18, 1907, vol. 58, pp. 52–53.

Evaporation losses in irrigation. Illus. Samuel Fortier, Eng. News, Sept. 19, 1907, vol. 58, pp. 304–307.

Rice irrigation, water supplied by centrifugal pumps. (Short news item.) Eng. News, Oct. 10, 1907, p. 395.

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Half a million acres of land will probably be under irrigation in 1908. (Table.) Eng. News, Mar. 19, 1908, vol. 59, p. 326.

Progress and cost data, U. S. Reclamation Service projects. Eng. News, Apr. 23, 1908, vol. 59, p. 468.

Remarks of A. P. Davis at Washington Soc. Engrs. dinner, on conservation. Eng. News, May 21, 1908, vol. 59, p. 576.

Conference on the conservation of natural resources. Eng. News, May 21, 1908, vol. 59, p. 557–564. (Group photo of F. H. Newell and others.)

Effect of alkali soils on concrete. (Experience of U. S. Reclamation Service.) Eng. News, July 23, 1908, vol. 60, pp. 99–102.

Rejection of unduly low bids. Remarks of Jas. R. Garfield. Eng. News, Oct. 22, 1908, vol. 60, p. 439.

Elections and engineers. (Editorial including praise of U. S. Reclamation Service.) Eng. News, Nov. 5, 1908, vol. 60, pp. 501–502.

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A possible method of reclamation for the arid West. William O. Mieir, published at Westminster, Colo., 1909, 21 pp.

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Proposed construction work of the Porto Rico irrigation service. Illus. B. M. Hall, Eng. News, May 27, 1909, vol. 61, p. 568–569.

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Three kinds of conservation. (Editorial on President Taft's message and reference to Reclamation Service.) Eng. News, Jan. 20, 1910, vol. 63, pp. 74–75.

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Farming with water. A community builder in the Pecos Valley. E. V. Wilcox, Country Gentleman, Aug. 7, 1920, vol. 85, pp. 11, 27.

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**An account of the work of the Reclamation Service.

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